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Contents

	PAGE
EDITORIAL NOTES: British Celanese, Ltd.; Some New Text Books; Standardisation in Industry	359
Activated Carbon and Some of its Uses	362
Estimation of Chromium in Nickel-Chrome Alloys	364
Reviews	365
British Cellulose and Chemical Manufacturing Co.	366
The Relation of the British Chemical and Dyeing Industries	368
Thirty Years in the U.S.A. Benzol Market	369
The British Glue and Chemical Co.	371
A Power Station as an Exhibit	372
The Manufacture of Gas Mantles	373
From Week to Week	374
References to Current Literature	375
Patent Literature	376
Market Reports and Current Prices	379
Company News	384
Commercial Intelligence	386

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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"British Celanese, Ltd."

AT the ordinary general meeting of the British Cellulose and Chemical Manufacturing Co., Ltd., last week, it was decided to change the name of the company to "British Celanese, Ltd." The new title is both a shorter and a happier one; it is more likely to stick in the public mind, in itself an advantage to a manufacturing company; the change coincides with important extensions and developments, and the new name will serve as a reminder of the fabric "Celanese" which the company are putting on the market. Already, in fact, "Celanese" has begun to catch the eye, as the householder scans his morning paper during breakfast, and to take its place among the things that cannot be overlooked. Thus, presently, it is hoped to make it a popular selling article.

In his review of the company's affairs Sir Harry McGowan had many things of an encouraging character to report. The concern, for many reasons, has had a trying time to go through, with abundant criticism from those who dislike any Government financing of private concerns, and from other curious people who exult in the trials of any new British manufacturing enterprise. But there are signs that the difficulties are steadily being overcome and that a continuance of the present enterprising policy will gradually bring the company to a sound and profitable position. Sir Harry McGowan and his co-directors have had a troublesome position to deal with, and are entitled to congratulation on the progress they have made towards clearing it up. Among the good points it may be noted that since the beginning of the present financial year the profits made each month have been sufficient to pay all charges, including debenture interest. The total deficit of nearly half a million, instead of being made a reason for the writing down of capital, is carried forward—a deliberate decision which indicates the directors' confidence in the future. As a result of the steady improvement in chemical and manufacturing processes, the company's productive capacity has been increased to from 4½ to 8 tons per day according to the varieties of yarn required by the trade, and though the depressed condition of the textile trade has deprived the company of advantages they should have derived, these will probably be recovered later.

Apart from these details, what is most impressive is the courageous forward policy the directors have adopted for putting not only their yarns and cords at the service of manufacturers, but for producing finished fabrics for direct retail sale to the public. This, of course, is a considerable extension of the original plan and has involved much additional organisation. Simultaneously with the erection of plant for the larger production of Celanese yarn, weaving plant is being installed designed to reproduce on a manufacturing scale what has already been satisfactorily produced in bulk samples. The range of fabrics made is about 100, and several of these are now being produced at Lyons while the works at Spondon are being developed.

It would seem, then, that the company, after much difficulty and expense, have finally mastered the processes of production, dyeing, weaving, etc.—much valuable information having been acquired in the course of experiment—and that what remains is the energetic sales policy which Sir Harry McGowan commended so strongly to the shareholders. Success, in a word, now depends on successful salesmanship, and this is being undertaken with skill and energy. It is not always possible to secure immediately customers for even a better product than the one they have been accustomed to. Buyers and fashions are both conservative, and where particular products have become familiar on the market, diversion of patronage to new ones is bound to take time. The test in the end is quality. If the new goods do not prove to be at least the equal of the old their fate will be settled by a first experiment; if, on the other hand, experience shows them to be better, they are bound to come into vogue in the end. The directors of British Celanese, Ltd.,

have confidence obviously in the products they have laboriously prepared for the market, and they are showing their confidence by the vigorous propaganda on which they have embarked. As a British enterprise, which has courageously overcome many difficulties, it deserves success.

Some New Text-Books

It has been rightly said that the intricacies of scientific evolution have outstepped the receptive capacity of the human brain, so that it has now become necessary for the majority of us to rely upon others for much of our information and many of our facts. The thorough man to-day finds part of his essential equipment in card indexes and files, backed up with a comprehensive library containing not only modern text-books, but the proceedings of the various societies and copies of the weekly technical journals. When in doubt upon any particular point he turns to the work of the recognised authority on the subject, and in time he acquires a certain instinct for laying his hands on the precise information required. So far as science, both pure and applied, is concerned, there has been a prodigious demand for really authoritative reference books in the past five years; and a practice which appears to be growing is that which many of the large industrial firms have adopted of supplying their departments with a library to which all appropriate volumes are added as they appear. This is a recognition of the utility of text-books which has come slowly enough, but which now seems to have come to stay. After all, the cost of a text-book is insignificant in comparison with the value of the knowledge which the book, assuming it is really first-class, contains; and a few shillings outlay will frequently provide the key to a problem which otherwise might demand the expense of an expert adviser.

For this reason it has been argued that when an expert writes a book he is likely, from a purely pecuniary point of view, to do himself more harm than good; but facts have long since proved this to be a popular fallacy, for the writer who gives us the really standard work usually finds that he is at once marked down as an authority, and consequently his services are in increased demand. The publishers of The Chemical Age have not overlooked the fact that the technical chemist has not always in the past had at his disposal the exact type of book which he can turn to profitable account, and it should not be without interest to him to note the volumes which Ernest Benn, Ltd., now announce for almost immediate publication in their new "Technical Chemical Series." These volumes include "The Chemistry of Rubber," by Mr. B. D. W. Luff, chief chemist to the North British Rubber Company, "The Chemistry of Paints, Pigments and Varnishes," by Mr. J. Gauld Bearn, and "Synthetic Fats," by Dr. Middleton and Mr. T. Hedley Barry. During the winter a number of other volumes by prominent authors will be available in the same series, and these will be followed at intervals with further books which should make the series, when complete, one of the most comprehensive of its kind.

Standardisation in Industry

The question of standardisation in industry has recently become a matter of almost national importance in America, and it has been announced widely by some, among whom may be mentioned Mr. F. B. Gilbreth, a consulting engineer, that standardisation is the salvation of American industry. In this country we are rather inclined to look to America as a leader in this movement, but it is interesting to note that it is stated there that its importance has had greater recognition in Europe. It is, however, in America that there has been the most obvious triumph of standardising in the production of the Ford car. Mr. Ford is regarded almost as some kind of a wizard who can produce in fabulous quantities an article of undoubted value and utility, at prices which his competitors envy, and yet make a substantial profit and provide lavish benefits for his workers, who receive pay at the highest rates for a bare six hours daily. When it is asked how this is done, the reply is simply by organisation and standardisation. It is the application of the principle to methods of manufacture that is required, as it must not be supposed that a standardised product will always suit all users. Against standardisation it is said by many, including the Chairman of the American Standards Association, Mr. A. E. Whitney, that it tends to mediocre products, and that there is great danger in carrying it too far. Applied unintelligently it is certainly deadening for the individual worker, owing to the unattractive nature of standardised routine. The suggestion which has been sometimes made that a considerable portion of our modern labour troubles are due to this deadening effect must not be dismissed lightly. It is one of the principles in the Ford system that standardisation enables shorter hours to be worked and allows the worker freedom for individual outlets in other directions. This seems to be one of the necessities of standardised industry.

There seems to be room yet for much standardisation in industry, provided certain limitations are recognised. In the chemical industry standardised products are essential, and each manufacturer as a matter of course guarantees his different grades to be up to definite standards of purity. To secure this analytical control of the product is required, and control through the stages of manufacture is now being recognised as desirable, so that each step is capable of exact repetition. There is room, however, for better standardisation of products between manufacturers, particularly with dyes, on the lines which have been adopted in the case of neutral sulphate of ammonia, for example. In plant, standardisation of such things as pipes, taps, bolts and other small units, with a view to ready interchangeability, is of the greatest value—a fact generally recognised but not by any means universally adopted. In this direction the work of the British Engineering Standards Association is worthy of commendation. In the laboratory, too, judicious standardisation can improve efficiency, but in some kinds of work such as research it is impossible so far as material or time is concerned. Research is almost an art and is definitely not amenable to standardising.

Storing Steam

A CORRESPONDENT who was interested in our recent allusion to the employment of abnormal steam pressures has drawn our attention to yet another development in the utilisation of steam which should do much to enhance the rather deplorable efficiencies that are common to-day. He refers to the possibilities of employing steam accumulators or storage vessels in all those cases where the demand on boilers is intermittent or fluctuating. Many processes in chemical works demand an intermittent steam supply, so that the blowing off of large quantities through safety valves is a common sight in many works. It is, again, always more satisfactory to work a boiler plant at maximum load at all times. If, then, the average consumption is calculated and the installation is supplemented with a steam accumulator which will take up excess steam temporarily and yield it up when large demands are needed, substantial economies are rendered possible.

Steam storage is by no means a new idea, but the advances in design evidenced by, say, the Ruths accumulator are responsible for the favour which this means towards steam economy is finding to-day. In principle the steam accumulator is simple, for all that is required is a well insulated body of water which will take up excess steam at the boiler pressure and yield it up as the pressure is reduced. The Ruths accumulator consists of a heavily lagged container, 5 metres in diameter and 20 metres long, capable of holding over 300 tons of water and of storing 12 tons of steam. The latter has been stored for a period of several weeks with a loss of only a few points per cent. Suitable valves and the like allow of the admission of steam to the accumulator and the withdrawal when demanded, both operations being perfectly automatic and maintaining the steam pressure in the service mains at an even level. The storage of steam can be regarded as quite practicable, and installations of accumulators are now in existence in this country, America, France, Germany and Sweden. As our correspondent points out, this is only one of many directions in which improved efficiency may be looked for. Such questions as the control of combustion, water softening to as near zero hardness as is economically practicable, oxygen elimination from feed water, mechanical handling of fuel and ashes, and recovery of combustible matter from ashes before dumping, combined with thorough attention to all the possibilities of heat recovery and conservation, should always be present in the mind of the modern boiler plant engineer.

The Federal Council

WE have received a copy of an appeal on behalf of the Federal Council, which is dated January 1, 1923, for funds to carry on the work of the Council, together with a first list of subscribers. Originally, as most people know, it was contemplated, during Sir William Pope's presidency of the Society of Chemical Industry, raising a fund of half a million for the establishment of central chemical headquarters in London. That, for various reasons, was abandoned, and the Federal Council fell back upon a much more modest scheme to enable it to carry on its useful work until a more favourable opportunity occurred for some larger venture. In the matter of appeals much depends on the standard set by the first group of donors, and as the present list is headed by Brunner, Mond and Co., with £100, it is not surprising to find the amounts lower on the list of comparatively slender proportions. It is also important to put a bold and definite case forward if large donations are to be obtained, and excellent as the idea of encouraging unity between the different chemical organisations is, it makes no very dramatic appeal to the imagination. In the circumstances a modest response to a modest appeal was rather to be expected. Sufficient, however, has been raised to constitute the nucleus of an endowment fund, and to enable the Federal Council to carry on until those who sympathise with its work have more cash to spare on expansions.

Points from Our News Pages

Articles are published on "Activiated Carbon and Some of its Uses" (p. 362), and "The Estimation in Nickel in Nickel-Chrome Alloys" (p. 364).

Reports are given of the company meetings of the British Cellulose and Chemical Manufacturing Co. (p. 366), and British Glues and Chemicals Ltd. (p. 370).

Sir Max Muspratt spoke recently on the Relation of the British Chemical and Dyeing Industries before the Society of Dyers and Colourists at Bradford (p. 368).

According to our London Market Report, trade during the week has been quietly steady, with indications of a broadening demand (p. 379).

There has been a little more inquiry for heavy chemicals during the past week, according to our Scottish market report (p. 382).

Books Received

NICKEL ORES. By W. G. Rumbold. London: John Murray. Pp. 82. 5s.

CHEMICAL ENGINEERING CATALOG. New York: The Chemical Catalog Co., Inc. Pp. 1,056.

THE CHEMICAL RESISTANCE OF ENGINEERING MATERIALS. By Marston L. Hamlin and Francis M. Turner. New York: The Chemical Catalog Co., Inc. Pp. 268. $5.00.

The Calendar

Oct.		
6	West Yorkshire Metallurgical Society: Annual General Meeting. 7 p.m.	George Hotel, Huddersfield.
9	Institution of Petroleum Technologists: General Meeting. "Recent Research bearing upon the Origin of Petroleum," by E. H. Cunningham Craig. 5.30 p.m.	The Royal Society of Arts, John St., Adelphi, W.C.2.
9	Institute of Metals (N.E. Coast Section). Chairman's address. Professor H. Louis. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
11	Institute of Metals (London Section): Chairman's address. D. Hanson. 8 p.m.	Institute of Marine Engineers, 85–88, The Minories, Tower Hill, E.1.
12	Institute of Metals (Sheffield Section): "Electric Resistance Furnaces." A. G. Lobley. 7.30 p.m.	The University, St. George's Sq., Sheffield.
12	Institute of Metals (Swansea Section): Chairman's address. E. E. Dendy. 7.15 p.m.	University College, Singleton Park, Swansea.
13	Mining Institute of Scotland: General Meeting.	Edinburgh.

Activated Carbon and Some of Its Uses

A technical correspondent, who has studied the subject for some years, discusses the constitution and uses of activated carbon, and embodies in the article the published information of the leading authorities.

ACTIVATED CARBON, in the modern sense of the term, is a comparatively new material to enter the industrial field, but it is rapidly becoming recognised as one of the great discoveries of modern times. To say nothing of its great utility as a protective agent against poison gases in the war, a subject which received abundant attention during and immediately after the war, its uses in peace time are being constantly widened and its economic importance continually being demonstrated in new directions.

To mention only a few of its applications is sufficient to call attention to its great utility in the industrial world. It is used as a protection for workmen against all kinds of noxious and poisonous vapours in chemical works, as a means of enabling firemen to work in smoke and fumes with safety, to prevent the escape of objectionable fumes in certain industries, and to the recovery of a large number of volatile and valuable substances in the chemical industry. Perhaps its most important use at the present time is in the recovery of gasoline or petrol from natural gas, especially in the gas which is relatively poor in condensable vapours, and also in the recovery of benzol and light oils from coke oven gas. As a purification agent for certain gases required with a high percentage of purity its use is unrivalled.

The uses of this important material are really only beginning. It is safe to predict that ere long it will be found to possess properties making it applicable for purposes of even greater importance than its present employment, particularly in catalysis, synthetic chemistry, and polymerisation processes.

What is Activated Carbon?

This is a question to which no really satisfactory answer can yet be given. Practically all that can be said is that it is carbon in a peculiar physical condition obtainable by special methods of manufacture, a condition which is not found in natural carbons such as coal or other mineral carbons. According to Dr. N. K. Chaney, the greatest United States authority on activated carbon, the material exists as a distinct physical modification, differing from inactive forms by some characteristic peculiarity of molecular structure or arrangement.

It is true that many kinds of carbonised material possess the active principle in a very minor degree. These include ordinary wood charcoal, chars of various vegetable substances, bone char, and even coke, but the active principle in these is relatively so feeble as to exclude them from the field occupied by the product which is the subject of this article. Such feebly active substances have had a limited industrial use, mainly as decolourising agents for syrups, oils, etc.

Bone char in particular has for many years found employment as a decolouriser of sugar syrups. For all such purposes, activated carbon is considered to be greatly superior.

The essential properties of an "activated" carbon are: (1) proper physical structure, (2) high adsorptive capacity, (3) selectivity of adsorption, and (4) the property of permitting the adsorbed substances being easily removed from the carbon.

In nearly all applications of gas adsorbing carbon it is necessary to bring large volumes of gases in contact with the carbon, and this is usually effected by causing the gases to pass through a thick bed of the granular material. In a gasoline recovery tower, for example, many thousand pounds of the carbon may be used, and to resist the crushing effect of its own mass considerable mechanical strength in the carbon is necessary. The most efficient carbons have a block density of about 0·66, and in a granular condition of, say, 8 to 10 mesh, an apparent density of 0·41. This need for relatively high mechanical strength and density limits the field of research for suitable raw material to make gas adsorbing carbon. One of the most successful of the numerous materials tried is the carbonised shell of the cocoanut. A softer and more friable material can be "activated" without difficulty, and its use for decolourising syrups, oils, etc., is quite feasible.

The most active gas adsorbing carbons have only sufficient capillarity to allow a maximum of active carbon to be exposed. The capillary channels must be of extremely small diameter and very numerous, so as to provide a surface for adsorption immense compared to the volume of the carbon.

Activated carbon, when saturated, holds gases and vapours in two different ways, one is by capillary condensation, a property possessed also by some porous non-active substances. But the essential property upon which the selective action of activated carbon depends is the specific attractive forces of the material, whatever these may be.

Saturation of activated carbon may be obtained by exposing it to the action of a pure vapour, such as that of carbon tetrachloride, at a temperature of 25° C. In a specified case, 100 grams of the saturated material was found to have adsorbed 110·9 grams of the tetrachloride. Of this 80·9 grams were driven out of the carbon at a moderate temperature, and was assumed to be the amount due to capillary action.

The remainder, which was much more tenaciously held, was considered as the quantity adsorbed due to specific attraction and a measure of the "activity" of the carbon. When the concentration of the gases and vapours is high, the total adsorption capacity is important, and the value of the adsorbent, apart from other factors, is determined by its saturation value. But when the concentration of the gases and vapours to be adsorbed is low, which is the case with gasoline in natural gas, and in the majority of other cases, the value of the adsorbent is measured chiefly by its specific capacity or retentivity. (See Professor Briggs, *Proc. Roy. Soc. Edin.*, vol. 42, 1922, pp. 26–33.)

In this case it appears that the gasoline or other adsorbed vapours are preferentially selected, and that they can displace any others that may be first adsorbed.

Gases and vapours are usually, but not always, adsorbed in the order of their boiling points—that is, the most easy to liquefy are usually the first to be adsorbed. Their chemical nature is also of importance in this connection; the more reactive substances being usually preferentially adsorbed.

It has been shown that activated carbon does not adsorb water, but holds it merely by capillary attraction. In this respect it differs from other adsorbent material, notably silica gel, which adsorbs water and holds it very tenaciously. If, therefore, water is a constituent of a mixture of gases or vapours, active carbon may be used, but not silica gel, as the adsorbent. The hydrocarbon vapours displace water from active carbon, but if silica gel, otherwise an active adsorbent, be used, it is first necessary to dry the gases or vapours.

The problem of removing adsorbed substances from activated carbon is quite simple. Temperatures of from 100° to 150° C. are sufficient, and the heat can be supplied in the forms of hot air, steam, or boiling water. The use of super-heated steam, once thought to be essential, has been found unnecessary; low-pressure saturated steam effects a practically complete removal. If it be desired to recover the substances free of water, the saturated carbon may be heated by steam coils, by passing hot gases through it, or by immersing the carbon in a hot liquid metal. (Brit. Pat. 170,323.)

Commercial Uses

The commercial uses of activated carbon fall into the following categories: (1) separation and recovery of gases and vapours, (2) purification of gases, (3) storage of gases, (4) catalysis, and, according to A. Ray (*Chem. and Met. Eng.*, Aug. 27, 1923, p. 354), for the production of high vacua. A few illustrative details may be mentioned, but space will not permit a full description of the many methods in use.

According to Ray, quoted above, 83 million cub. ft. of natural gas is treated daily in the United States by the carbon method for extracting gasoline, and twelve other plants for using this process are under construction with a combined capacity of dealing with 180 million cub. ft. per day. The natural gas is passed through a deep bed of carbon in an adsorption tower until the gas is free of gasoline. Saturated steam at 15 lb. pressure is then passed into the adsorber which

removes the gasoline, which goes to a condenser. Three adsorbers are usually employed; thus, while one is being steamed, gas is being passed into the others, one taking fresh gas, and the other the denuded gas from the first, by which it is cooled from a previous steaming.

The operations are said to be practically automatic and consist of controlling a few valves. It is claimed also that the plant is cheaper to instal and to operate, and that it produces more and a better grade of oil than is obtainable by either the compression or the oil absorbing processes.

The process is also applied to the recovery of gasoline ordinarily escaping with the gases made in cracking heavy oils, and to recovering the evaporated gasoline from storage tanks.

The recovery of volatile solvents by activated carbon is particularly successful. A. L. Davies (*Ind. and Eng. Chem.* 1925, pp. 631–2) states that acetone, butanol, and ethanol, contained in gases from certain fermenting processes are readily recovered by the use of activated carbon.

The Extraction of Benzol

The extraction of benzol and light oil from towns' gas by mears of activated carbon is quite easy, provided the gas is first scrubbed to remove tar, ammonia, and cyanogen compounds. A series of adsorbers is employed, the first of which takes up all condensable gases, including ethylene. Eventually the selective properties come into play, and benzene and its homologues displace ethylene and other substances first adsorbed. The gases from the first adsorber are mixed with a little air and passed to a second adsorber, in which the activated carbon acts catalytically to convert hydrogen sulphide in the gas into sulphur and water. The sulphur is retained in the carbon, from which it can be removed by one of several solvents.

The benzene group is obtained from the carbon by the usual steaming method.

The purification of gases, including the removal of noxious odours, is a simple filtration of the gases through activated carbon filter beds. The gases which can be treated are: carbon dioxide for the aerated waters industry, hydrogen for hydrogenating purposes, helium for air ship inflation, ammonia, acetylene, drying gases, etc. In this category are included the deodorising of refrigerators, submarines, and other confined spaces; the recovery of sulphur dioxide, and the oxides of nitrogen.

Uses as a Catalyst

As a catalyst activated carbon has numerous and important uses, and in this direction it is safe to predict a great widening of its scope in the future. The present applications include the conversion of hydrogen sulphide into water and sulphur, the acceleration of the oxidation of nitric oxide as much as 500 fold, and the promotion of the chlorination of hydrocarbons.

In the storage of compressed gases, Ray states that activated carbon is of great service. As an example, a cylinder containing activated carbon will take 66 per cent. more nitrogen at 35 atmospheres pressure than the same cylinder without the carbon.

The reactions of gases with liquids may be effectively accomplished by bringing the liquid in contact with the gas adsorbed by active carbon. (Brit. Pat. 188,627–1922.) The process is said to be applicable in bleaching liquids, in the decomposition of or oxidation of mineral oils for the purpose of converting them into fatty acids and other compounds, and in purifying and sterilising water or other liquids with chlorine. Activated carbon impregnated with metals, metallic oxides or salts, is said by Ray to have a wide field of usefulness as a catalyst.

In obtaining high vacua in scientific investigation, activated carbon has been found useful in adsorbing the last traces of gases. Commercially it can be used for obtaining a vacuum in containers in which are substances to be heat insulated. The container is partly filled with the carbon, roughly evacuated and then sealed up. The carbon then absorbs the remaining gas and the vacuum thus created makes a good insulation. It is said that Professor H. Briggs has investigated this application of activated carbon with interesting results.

Death of Professor McLeod

PROFESSOR HERBERT MCLEOD, F.R.S., who died on Monday at his house in Richmond, at the age of 82, was distinguished as a chemist, physicist, and scientific bibliographer. He was born at Stoke Newington on February 19, 1841, and was sent to Stockwell Grammar School. At the age of 19 he became assistant chemist in the School of Mines, and there, under Hofmann and E. Frankland, at once engaged in research, chiefly on the physical side. In 1871 he was appointed Professor of Chemistry at Cooper's Hill, a post which he held for thirty years. He contributed many papers to the Physical, Chemical, and Royal Societies, of which the best known, published in the "Philosophical Transactions" for 1880, was written in association with G. S. Clarke, and described a method which the authors had devised for studying the behaviour of tuning forks by comparing the vibrations with white lines on a revolving black cylinder. This and earlier work gained for him the Fellowship of the Royal Society in 1881. He was president of the Chemical Section of the British Association at the Edinburgh meeting in 1892. St. Andrews conferred on him the hon. LL.D.

McLeod, however (according to a writer in *The Times*), did a greater service to science than his own research and educational work. Towards the end of the last century the Royal Society, in association with representatives from most foreign countries, founded the International Catalogue of Scientific Literature, with the object of publishing in annual volumes indexes to scientific research in the different branches of science. To make these indexes retrospective would have been a task colossal in cost and magnitude. The Society accordingly decided to compile and issue a "Catalogue of Scientific Papers," published up to 1900. In this bibliography the titles of the papers were given in alphabetical order under their authors' names, without classification into the different branches of science or indication of their contents, apart from that contained in the titles. Even on this reduced scale the task was gigantic and demanded endless patience, a very high degree of accuracy, and a swift and sound judgment in weeding the wheat from the tares. McLeod undertook the labour of directing the staff of compilers and of arranging and editing their work. It was almost too much for his frail physique, but he had the satisfaction of seeing it nearly completed.

Acetic Acid Consumption in British Malaya

WITH the exception of native rubber holdings and the possible exception of one or two large estates, all rubber latex produced in British Malaya is coagulated with acetic acid. During the war, when supplies of acetic acid were difficult to obtain, sulphuric acid came into general use. This acid is cheaper than acetic, but its use has been condemned by the Department of Agriculture of the Straits Settlements and Federated Malay States and also by the Rubber Growers' Association.

From the following table it will be seen that the value of acetic acid imports has risen enormously since 1920. The sources from which the acid has been imported are interesting. In 1921 Canada furnished almost 50 per cent. of the supply, but she has now ceased from competition in the market. The bulk of the acid is now supplied by European Continental countries. Details as to the respective quantities exported by the different countries of the Coutinent in 1922 and 1923 are not yet available, but in 1921 the Netherlands and Germany were the only two European Continental countries exporting the acid to Malaya. The value of Japanese acetic acid rose enormously in 1922, but has fallen again during the first half of the current year. The following is a table of the values of acetic acid imported into British Malaya in 1921, 1922 and the first half of 1923, showing countries of origin :—

	1921.	1922.	1923 (to June).
	£	£	£
United Kingdom	390	7,920	4,792
British Possessions.....	11,332	540	Nil
Continent of Europe	3,819	80,347	52,213
United States	5,565	751	1,017
Japan	2,366	29,121	4,450
Other countries	Nil	245	Nil
Total	23,472	118,924	62,472

The Estimation of Chromium in Nickel-Chrome Alloys

By "Mett"

THE analysis of the alloys of nickel and chromium, which frequently also contain copper, iron and small amounts of other metals, and which have recently become popular for electric heating units and purposes where resistance to high temperatures, acids, and corrosive furnace gases is desired, presents numerous difficulties which cannot be overcome by the commoner methods of alloy analysis. One of the greatest of these difficulties is met with when trying to take into solution the alloy in a rapid and convenient manner. Acid solvents—of which a mixture of strong nitric and sulphuric acids is usually the most efficient—may break down the alloy, but generally a residue consisting of carbon, silicon, and chromium, and often a little nickel, iron, and copper, is left undissolved. Repeated attack with tri-basic fusion mixture at a red heat may be found efficacious for taking into solution those few alloys of this series which are so brittle that they can be reduced to a very fine powder.

The readiest means of dissolving the alloys of such compositions as have been recently commercialised is by the use of fused alkalis. Unfortunately the alkali attack is so virulent that a suitably refractory containing vessel is difficult to select. Silver crucibles are thought to be too expensive, so that nickel ones are generally used, and a large amount of nickel is thereby carried into solution along with the alloy. This nickel, together with that from the alloy and also any copper and iron present, colours the solution so deeply that the subsequent volumetric estimation of chromium in this solution is only carried out with difficulty and uncertainty.

The following process avoids such a deeply coloured solution by stipulating the separation of the chromium as lead chromate prior to its determination by the volumetric method. The process has been designed essentially for routine analysis in the works laboratory, and in such service it has proved satisfactory. The operations may be conducted rapidly, and are so arranged that a stream of estimations may be kept working almost as easily as a single analysis. It is also free from those tedious refinements which may be necessary to the research student but which are only tiresome and delusive to the works analyst.

The process should be operated as follows. Weigh out from 0·2 to 1 gm. of the alloy according to the amount of chromium suspected to be present (0·3 gms. is a convenient weight when the sample contains about 15 per cent. chromium); place in a nickel crucible about 3·5 cm. diameter, and stir by means of a glass rod with 10 gms. or so of sodium peroxide. Heat cautiously in a bunsen burner until the mass is liquid, and then maintain at incipient redness whilst gently shaking round the crucible until all the alloy has dissolved.

It is very important that the first part of this operation be conducted carefully, as when the attack commences a great amount of heat is produced and the reaction proceeds on its own volition. If the heating by the burner be continued at this stage the melt is extremely liable to boil over, with disastrous inflammable effect on anything upon which it spills. The end of the fusion is usually easy to judge, as by titling the crucible any fragments of alloy undissolved will be noticed at the bottom of the liquid fusion. The complete operation will seldom occupy more than about four minutes.

When the crucible is quite cold, and not before, it should be placed in a tall beaker, covered with about 200 cc. of water and boiled for two minutes. Remove the crucible from the solution by means of a glass rod and rinse carefully into the beaker. Ignore the black coating of nickel oxide on the inside of the crucible. The liquid may now be acidified with dilute nitric acid and heated until all except any gelatinous silica present has passed into solution. Ammonium hydrate should then be added carefully to neutralise the excess acid and to form a slight permanent precipitate of metallic hydroxides, which should then be redissolved by acetic acid, of which a slight excess is required. Heat the solution to boiling, and add slowly 20 cc. of lead acetate solution (semi-normal or 10 per cent.). A yellow to orange coloured precipitate of lead chromate will be thrown down, and the liquid should be boiled for a couple of minutes to complete the precipitation and should then be allowed to stand in a hot place for a few minutes until the precipitate settles. Decant off the mother liquor through a smooth hard filter made of the smallest possible quantity of asbestos pulp. Do not trouble to wash the filter, but allow it to drain, and then transfer the pad of asbestos and precipitate to the beaker in which it was precipitated. Add a little water and 40 cc. of dilute sulphuric acid (twice normal or sp. gr. 1·07), and boil to dissolve the chromate. The yellow precipitate dissolves to form a yellow solution, and a white precipitate of lead sulphate is formed so that it is somewhat difficult to decide exactly when the total conversion has taken place, but usually about five minutes' boiling will be ample. Cool the solution and dilute to a suitable volume for titration.

The titration is carried out in the usual manner with standard solutions of ferrous ammonium sulphate and potassium permanganate. The ferrous ammonium sulphate solution is run into the solution of the sample until the yellow colour is completely changed to emerald green, and 1 cc. or 2 cc. excess are added. Standard permanganate solution is then added drop by drop until a pink coloration is obtained which persists for five seconds. The volume of ferrous ammonium sulphate solution which corresponds to the quantity of potassium permanganate used is subtracted from the total amount of ferrous ammonium sulphate solution used, and the remainder represents the amount of chromium present. The potassium permanganate solution is standardised against the ferrous ammonium sulphate, and if it can be contrived to have the two solutions exactly equivolumetric some calculation will be saved. To standardise the ferrous ammonium sulphate solution use a carefully prepared standard solution of pure re-crystallised potassium dichromate.

Deci-normal solutions will be found quite strong enough and contain the following weights of salts:—

Potassium permanganate..... 3·161 gms. per litre.
Ferrous ammonium sulphate.....38·009 gms. per litre, of which 1 cc. is equivalent to 0·00173 gms. chromium.

Note that only one beaker is used throughout the analysis, so that care should be taken in the first place to choose a shape and size suitable for the final titration. A tall wide-mouthed conical shape of about 500 cc. capacity will be generally found convenient.

The Institute of Metals

THE Institute of Metals has just issued its programme of meetings and lectures for the Session 1923–24. There are over thirty lectures and addresses to be given before the Institute's local sections in Birmingham, Glasgow, London, Newcastle-on-Tyne, Sheffield and Swansea, as well as at meetings of the parent Institute, one of the latter including a lecture by Dr. F. W. Aston, F.R.S., which is to form part of the proceedings of next year's Empire Congress of Mining and Metallurgy. The subjects of the lectures are of a character to interest engineers and metal workers, and include "Extrusion Problems," "Nickel Brasses," "Some Impressions of American Non-Ferrous Metallurgy," "Metals for Lamp Manufacture," "X-Rays and Metallurgy," "General Scientific Brass Foundry Work," "Alloys for Use with Superheated Steam," "The Density of Alloys," "The Annealing of Non-Ferrous Metals," "The Action of Molten Brass on Nickel Steel," "Propeller Brass," "Large Metallic Crystals and Some of their Properties," "The Cold Working of Metals," "Electric Resistance Furnaces," "Substitutes for Platinum," "The Metallurgical Microscope," and "Influence of Casting Temperature on the Physical Properties of Metals." A ballot for the election of members of the Institute (whose membership covers that of the local sections) is due to take place shortly, and full particulars can be obtained from the Secretary of the Institute, Mr. G. Shaw Scott, M.Sc., 36, Victoria Street, London, S.W.1.

Reviews

THE CAUSES AND PREVENTION OF CORROSION. By ALAN A. POLLIT, M.Sc. London: Ernest Benn, Ltd., 1923. Pp. 230. 25s.

The subject of corrosion of ferrous and non-ferrous metals is one of paramount importance, and has received increased attention during the past decade. A number of reports have been issued under the ægis of the Institutes of Metals and Civil Engineers, and of the Iron and Steel Institute, and the causes and prevention thereof under varying conditions have been considered in a large number of papers by individual workers. The recent suggestion by Sir R. D. Hadfield that, of the 1,860 million tons of steel produced in the period 1860–1920, some 660 tons were probably lost by rusting in use—and, estimating the loss due to corrosion in 1920 as 29 million tons—has served to give engineers and chemists a better conception of the wastage due to corrosion, and to place before them the value of the financial economies which may be effected by successful preventive methods.

The engineer and works chemist in general practice have not access to the original literature, which is often difficult to obtain, but are dependent for information upon text books, together with a study of such papers as meet his attention in his favourite technical journals, and in the annual reports of the Society of Chemical Industry.

The author of the volume under review has attempted to deal with corrosion problems in a comprehensive manner. His aspect is essentially practical, and with the assistance of the publishers he has produced a book which it has been a pleasure to peruse. The general arrangement and clearness of type and of the 47 diagrams are excellent. The matter included has been carefully chosen, and, on the whole, well proportioned. No attempt has been made to deal with special cases such as arise under chemical works conditions, but a special chapter might have been devoted with advantage to soil corrosion and the problems that arise in the protection of buried gas, water and other mains.

The contents are divided into three main sections, viz.: The Theory of Corrosion, the Causes of Corrosion, and the Prevention of Corrosion. Under the first section the main theories of corrosion are briefly considered, and the difficulty illustrated of covering by one theory effects which may be caused by actions of more than one type acting under the influence of a possible series of varying factors. Part 2 deals with the causes of corrosion, and chapters are devoted to the influence of oxygen, electrolytes, physical and chemical heterogeneity of the metal, impurities in water, a special chapter being devoted to the corrosion of condenser tubes. In Part 3 the prevention of corrosion is considered in chapters dealing with the control of quality of the metal, the use of oxide and non-metallic coatings, metallic protective coatings, paints and allied coatings and feed water treatment.

One or two minor errors occur in the text. On page 15 the decay or rotting of timber is stated to be accomplished in an analogous manner to the corrosion of metal, and rocks, but surely the main cause of timber rotting is the attack of living organisms. The reference to the use of tar on page 166 would seem to suggest that the crude product should be used in Wood's process. The cost of complete removal from crude tar of the ammoniacal liquor with practically the whole of its free and combined ammonia content, and the greater proportion of the tar acids, is neither expensive nor difficult, and the prepared product only should be used for preservative coatings. The word "excessive" on page 67, line 16, should read "unusually high"; and figure 5 on page 51 should be brought nearer to the reference to it in the text on page 38. Slight typographical errors occur on pages 34, 53 and 75.

We are sure that if in a future edition the author could see his way to appending a bibliography, whereby a student could further develop the subject and consult the original literature, every careful reader would be grateful to him.

P.

WOOD DISTILLATION. By L. F. HAWLEY. New York: The Chemical Catalogue Co., Inc. Pp. 141. $3.00.

This work forms one of the American Chemical Society's series of monographs on science and technology. The determination to publish such a series of work was arrived at at the Inter Allied Conference of Pure and Applied Chemistry in 1919. The objects of the monographs are to supply up-to-date information upon a chosen topic in a form likely to be useful to all technically educated people and not only to those particularly skilled in the art under discussion. On the other hand, the books are intended to be written by experts who are to weed out the literature and point to directions in which further research is desirable. The author, who is in charge of the Derived Products Section of the Forests Products Laboratory, tackles his subject in a critical manner, but gives very comprehensive references to whatever matter is being dealt with. In view of the shortage of good literature on the important subject of wood distillation and the scattered nature of the researches dealing with it, it is a judicially-written monograph which should prove of great value. The writer states quite candidly where he is dealing with work of which he has had no personal touch, and throughout he endeavours to show how complex are the problems and how influenced by comparatively small variance in plant or raw material. The work is one which might be read with advantage by those who are interested in the low temperature distillation of coal, for the complexity of the problems they are embarking upon will then be brought home to them. The book is interestingly and clearly written and is divided into two parts, dealing with hard wood distillation and resinous wood distillation. It makes no pretence to take the place of such a volume as *Klar*, but it admirably serves the purpose for which this series of monographs was originally intended.

W. R. O.

ABSORPTION OF NITROUS GASES. By H. W. WEBB, M.Sc., F.I.C. London: Edward Arnold and Co. Pp. 372. 25s. net.

The problem of the absorption of nitrous gases is closely connected with the question of the fixation of atmospheric nitrogen and the success or failure of the fixation process largely depends on the efficiency of the absorption apparatus. In Mr. Webb's book the author deals with the problem in view of this association, and considers mainly the difficulties arising in the absorption of the acid gases by water, and the means that have been devised in various instances for overcoming them. Thus the construction of the absorption towers and the nature of the filling material are considered in some detail. The production of synthetic nitric acid, nitrates and nitrites is also dealt with, together with the use of sulphuric acid, alkalis, cyanamide, etc., as absorbing agents. A final chapter is devoted to the analytical control of the manufacturing process, including methods of sampling the product at different stages.

MERCURY ORES. By EDWARD HALSE, M.Inst.M.M. London: John Murray. Pp. 101. 5s. net.

MOLYBDENUM ORES. By Dr. R. H. RASTALL, F.G.S. London: John Murray. Pp. 86. 5s. net.

These two little books are published in the series of monographs now being produced under the direction of the Imperial Institute, and deal with the nature and deposits of the ores in question, in each case by authoritative writers. A useful bibliography is included in each volume.

PRACTICAL CHEMISTRY FOR HIGH SCHOOLS. By H. B. DUNNICLIFF, M.A., B.Sc., A.I.C. London: Macmillan and Co., Ltd. Pp. 280. 5s.

This text book is intended to instil into the absolute beginner some of the principles of practical chemical laboratory work, and in a book of this scope the very detailed instructions which are given as to the handling of apparatus and carrying out experiments are commendable, although some teachers may, of course, wish to modify them slightly.

SUPPLEMENTARY NOTES ON GRAVIMETRIC ANALYSIS FOR BEGINNERS. By W. LOWSON, B.Sc. London: Longmans, Green and Co. Pp. 58. 2s. 6d.

This little book, the scope of which is indicated by the title, is intended to be used in connection with ordinary text books, and deals with the difficulties usually met with by beginners in gravimetric work. It may be noted that the book is dedicated to Professor Arthur Smithells "in memory of 25 years of happy association at Leeds."

British Cellulose and Chemical Manufacturing Co.

Sir Harry McGowan's Review of Recent Developments

At the fourth ordinary general meeting of the British Cellulose and Chemical Manufacturing Co., Ltd., held in London on Thursday, September 28, Sir Harry McGowan (chairman) reviewed at length the present position of the company.

Constructional and Technical Problems

"At the last annual general meeting," he said, "it was made quite clear that the result for the period now under review could not be satisfactory, and in the circumstances I do not think the loss, actually due to trading, is worse than was expected. But the following reasons, amongst others, should be present to your minds in any consideration of that result. During that period our processes of manufacture in almost every direction were undergoing changes, not only with the object of improving the quality of our material, but also with the object of cheapening cost. All our expenditure in this connection has been charged to revenue.

"Those of you who have practical knowledge of the running of a factory, particularly of a plant engaged in producing something of a novel character, will appreciate the difficulties of endeavouring to keep up a steady rate of commercial output simultaneously with a keen and continuous battle against constructional and technical problems from day to day. Towards the end of this period we saw the fruits of the intensive efforts made by our chemists and engineers, and since the beginning of the present financial year, as indicated in the report, we have not made losses but have made profits each month sufficient to cover all charges, including debenture interest, but without regard to depreciation. You may say, that after all this time, there is not much satisfaction to be derived from such a statement, but in my judgment that view is not well founded. It was admitted at the last meeting that we had been led into the belief—which subsequently proved to be a mistaken one—when this company was formed for the manufacture of artificial silk that our products were capable of being made and sold in the same way as other similar manufactures, but as time went on it was realised that while on the one hand our product had many advantages as compared with other artificial silks, on the other hand its own peculiar characteristcs created technical difficulties which emerged in manufacture and which it has taken us a much longer time to overcome than we anticipated.

Government Policy Criticised

"In regard to the item, loss on plant, our report tells you the loss on the power house is covered, and the figure amounts to no less than £114,000. You will not forget that the likelihood of that loss falling on us was mentioned specifically at the last annual general meeting. It is a great hardship on us, as a company, to have to bear a loss of this character, which ought to have fallen on the Government who instructed us to erect the power house to meet war requirements. Expenditure on this scale would obviously never have been incurred for ordinary commercial requirements, and perhaps I might be allowed to say, for the last time on this occasion, that in my opinion if the whole history of the company in its relations with the Government and of its services during the war, is calmly surveyed, one can only conclude that the treatment of the company has been indefensible and probably without parallel. (Hear, hear.) The balance of that figure is loss on plant sold or written down, which again would not have fallen upon us if we had not been ordered to equip ourselves for war requirements at an expenditure which would certainly never have been contemplated for ordinary commercial purposes.

"The net total deficit amounts to £491,781 13s. 3d., which your board of directors intend to carry forward. At first sight one might say that this is a *prima facie* case for a further writing down of capital, and this aspect of the situation has been considered carefully by your board, but their recommendation in all the circumstances is that the debit should for the present be carried forward. The Preference shareholders may argue that this is somewhat hard on them, as it postpones the payment of their dividend, but they should be encouraged by my statement that to-day, so far as we can see, the loss on operations is arrested, and that as the dividend is cumulative, I am hopeful that the hardship is only of a temporary character. (Cheers.)

Satisfactory Production Figures

"We have completed the extension of our numerous manufacturing departments so that to-day Dr. Henry Dreyfus assures us we can produce four-and-a-half to eight tons per day according to the varieties of yarn required by the trade. Our working capital remaining, composed of raw materials, goods in process and finished goods, and our liquid cash resources are meantime sufficient to face the programme of production and sales we have set out to achieve, and given a return of demand in keeping with our new capacity to produce, we shall add to our working resources according as we make profits. Now, I propose to tell you in more detail what progress has been made in various directions.

"While the extensions from 1 ton per day to a 2½ or 3 ton output were in progress, the demand for our material steadily increased, and for a time outpaced our capacity—with some consequent discouragement to the trade and complaints of non-delivery. Following upon the arrangements for new finance, the company started to increase its capacity as quickly as possible, but during this time, unfortunately, textile trade began to get worse, with the result that demand fell considerably. Coupled with this, we became conscious of reluctance on the part of the manufacturers to use our material, because, in spite of the superior qualities of our product, they were hampered in their dealings by the cheap material which was coming from the Continent, and, therefore, they were not willing to pay the prices at which we were prepared to sell at that time. Conditions of trade were such that they were inclined to take the line of least resistance and not to make the initial efforts which would be necessary to secure recognition for a new product with advantages which were not fully realized by them.

Fabrics to be Produced

"During all this time we have had strikingly demonstrated to us the many different ways in which Celanese can be utilized in the production of fabrics of various kinds with many beautiful qualities, and what we call the "applications" or more advanced uses of our material appear to us to be of the greatest importance in stimulating the demand for Celanese. Producers of fabrics may be conservative and satisfied with what they already market, and we cannot perhaps expect them to be eager pioneers without some demonstration, not only of the technical possibilities of manufacturing our material in the different fabrics, but also their superiority when made, and their high degree of saleability. We have, therefore, to show the way and also to stimulate demand by getting into closer touch with the public who, when they get a knowledge of these fabrics, will undoubtedly ask the trade for them and expect to have Celanese products because of their quality. Such public recognition will be reflected indirectly upon the manufacturer and on the makers-up, and will induce them to buy our yarn and other intermediate articles in order that they may meet the public demands.

"Simultaneously, therefore, with the erection of plant for the larger production of Celanese yarn, we have under installation weaving plant of various kinds designed to reproduce on a manufacturing scale what we have already seen satisfactorily produced in bulk samples. The plant for the yarn and cord output has been completed more quickly than the plant for these 'applications,' as the former was, for the most part, available in our works or in this country, whereas the plant for the production of the fabrics has mostly to come from abroad. It would, of course, have been advantageous from a sales point of view if we could have had the latter products ready for marketing, giving us a direct outlet for our goods, and we should not have felt the effect of the depreciated exchange so much as we have done. So much for the nature of the machinery and plant which is being installed.

"I should like to say a word or two upon the class of output that we anticipate. The decision to carry our manufacture on a sufficient scale, beyond the stage of yarn and cord, was not suddenly adopted; it has been growing upon us as inevitable

during the past two years. We had sufficient machinery of this class in our works to enable us to work out the various processes as well as to assist other manufacturers to produce the materials. Moreover, in order to get quicker development, we made arrangements with a specialist in the natural silk trade who had already produced with our material a series of bulk samples of articles which had never been produced before. The result was that over 100 fabrics, varied in kind, but all of great beauty, have been produced with our Celanese, and, particularly in the finer fabrics, these cannot be made with any of the existing artificial silks. (Cheers). They imitate natural silk with great exactness, and in certain instances are even more beautiful than articles made with natural silk: amongst them I may name different types of crêpe de Chine, crêpe marocain, crêpe georgette, pongé japonaise, all of which have been produced by the specialist at Lyons, who will be manufacturing for us in bulk there while we are proceeding with the manufacture of such articles at our own works at Spondon as our machinery comes into operation. This fine-goods trade has perhaps the widest and most promising future, and has hardly any limit, although, in saying this, please do not forget that we are not neglecting the cord and yarn trade, for which there is a steadily growing demand.

Intrinsic Properties of Celanese

"It may not be out of place to give you an idea why we consider our silk is at least equal and in many respects superior to other artificial silks, and why it even supersedes natural silk in certain qualities. Celanese, which is the trade mark of our product, is an excellent insulator for electricity and for heat and cold. Up to the present, natural silk has been considered the best insulator from both points of view. It has now been proved, however, by tests made by various authorities that Celanese is much superior in its electrical insulating properties than natural silk. We are fully alive to the possibilities from the electrical point of view, but I will only say here that the non-conducting qualities have a special value in the textile industry, especially in clothing. I might explain in a simple way that our Celanese is of such a nature that the passing of excessive heat or cold is made extremely difficult. Celanese also resists water to a remarkable extent, possessing the property called by technical experts 'non-hygroscopic,' which translated into everyday language means that in spring, summer, autumn and winter you can always be suitably clad wearing Celanese. Other kinds are affected by humidity in the atmosphere, so that on a wet day, a feeling of dampness is created, with the unpleasant consequences so familiar to you all. The water-resisting character of Celanese means, moreover, that its washing properties are superior to those of any other artificial silk. You will no doubt have heard that Celanese literally improves with washing. In our opinion it is the nearest approach to natural silk in appearance and lustre. Furthermore, it has a great advantage over natural silk in tropical countries. The weather conditions in these countries often destroy natural silk, and this is especially due to a large amount of loading material which is put into the silk, and becomes weakened by the atmospheric conditions. Even when the silk is not loaded, it may decompose eventually, and the same applies in England, though to a less extent. That is one reason why merchants and shops are not anxious to keep large supplies of silk goods for considerable periods, as with this loading, especially on exposure in windows, the material deteriorates. Our experience of Celanese, on the other hand, is that it can be stocked in large quantities and may be kept for any length of time without any such consequences. (Cheers.)

"If any one thinks that I have been exaggerating the beauty of our fabrics, they can test it for themselves if they will go to our office at 8, Waterloo Place, and examine our samples, or will take the opportunity of looking at the fabrics at the British Empire Exhibition in a display which we contemplate having next April.

The Question of Dyeing

"At our last meeting you were told of the difficulties we had experienced, and the point that we had then reached. Since that time much has been done, and we have arrived at a stage when our technical advisers believe they are able to produce any colour, shade, or standard degree of fastness, as required. (Cheers.) Before reaching this stage, however, a new kind of difficulty arose, viz., that we were employing for the purpose a large variety of dyestuffs taken from different classes, each of which was satisfactory in itself, but which, when combined for the purposes of producing fashion shades was antagonistic one to the other, so that unless they were used in combination with exact scientific knowledge they were always liable to give rise to trouble even by ordinary dyeing methods. Therefore, although the company could dye satisfactorily at their own works, as could indeed some of the biggest dyers in the country, many dyers found the dyeing more difficult. To overcome this our research staff was increased and every effort brought to bear to find new dyestuffs which would not present these difficulties, and I am glad to be able to report that their efforts have led to our finding a reduced range of completely new dyestuffs following the ideas of Monsieur Clavel and made by the British Dyestuffs Corporation, Ltd., who have been of great assistance to us in this connection. (Cheers.) These have the desirable quality of simplifying our processes—of course duly patented—to such an extent that to-day I am assured we can execute practically all requirements with satisfaction. (Hear, hear.)

"While upon the subject of dyeing I might mention that it is a peculiar property of the new dyestuffs in conjunction with Celanese, that if Celanese is mixed with cotton or other fibres, the latter will be unaffected by the dyes, and from this you will realise that when fibres are woven or knitted containing mixtures of Celanese with other fibres in various proportions, quite unique effects can be obtained. The other fibres can either be left white or simultaneously be dyed with other dyestuffs for the same or a totally different shade. The development is in its infancy, but the field of possibilities is a wide one. Up till now, in producing the two-colour effect in a fabric with mixtures of other artificial silk and cotton, it has been necessary to dye one or other of the components beforehand to the shade required, but in our case the combination can be made without preliminary dyeing—a great advance. When these possibilities are developed, the saving in expense to the manufacturers of carrying different classes of stocks from which to make mixed colour goods should be very considerable.

Energetic Sales Policy

"I have already indicated that in developing 'applications' by producing fabrics, we are doing what is small relatively to the whole field, and therefore we are not really seriously entrenching upon the province of manufacturers who wish to use our yarn, and we are only too pleased to do all we can to assist them while we are defending the interests of our company to the best of our ability. I do thoroughly believe that the quality of our goods is now such as to give satisfaction in their use, and believing that, we are pursuing a most energetic sales policy. We want to encourage manufacturers to see the advantage of using our material for their products. We want to encourage the friendliness of the wholesalers and retailers, but above all it is necessary, in my opinion, that the demand should come from the actual user. That being so, may I suggest that our shareholders can help us considerably by specifying Celanese goods when they want that kind of article. (Hear, hear.)

"Of our ability to make profits under reasonable trading conditions I have no doubt whatever, and all our statistical records bear out this opinion, shared as it is by the entire board. Conditions of trade, now more difficult than ever in this country, due to causes with which I feel sure you are all more or less familiar, may not right themselves so soon as we all might wish. Pending such improvement we shall follow such a policy as will husband our resources to the best extent consistent with the development of our sales and the cheapening of our costs."

Mr. A. W. TAIT (deputy chairman), seconded the motion for the adoption of the accounts which, after a short discussion, was carried with acclamation.

Sir A. Trevor Dawson and Mr. Alexander Clavel, who retired by rotation, and Mr. A. W. Tait, Sir Josiah Stamp, Mr. Gustave Popelier, and Mr. Charles Charlier, who were appointed to the board since last annual meeting, were re-elected directors of the company.

On the motion of the CHAIRMAN, seconded by Sir JOSIAH C. STAMP, it was resolved that the name of the company be changed to "British Celanese, Ltd."

Relation of the Chemical and Dyeing Industries

Address by Sir Max Muspratt

SIR MAX MUSPRATT, chairman of the United Alkali Company (Widnes), lectured to the Yorkshire Section of the Society of Dyers and Colourists at Bradford, on Thursday, September 27, on "The Essential Partnership of the Chemical and Dyeing Industries." Mr. H. Jennings presided.

Sir Max Muspratt said that we were going through very serious times industrially, and there was a greater tendency to accentuate the differences between the various industries than to find any ground of partnership. At the same time, the existing conditions were such that the more they realised that they were all part of a great industrial system, and that it was up to them to throw everything into the common stock the better. The dyeing industry was one of the oldest in the world, but the chemists could only claim to be intelligent newcomers in industry. In their partnership they brought in the whole of the textile industry of the world. But upon how the chemists performed their duties and the users in the intermediate stages used their products, a great deal of the ultimate result depended. Curiously enough—he was speaking as a chemist—one of the most important textiles that had come into use in recent years was artificial silk. From a chemical point of view it was probably the most refined product which took part in the textile industry—except pure silk itself; and this very refined product was obtained from the crudest of raw materials—viz., wood pulp.

Artificial Silk

"That, to my mind," said the lecturer, "is a very great triumph for chemical science, and I think it is one that deserves our very closest attention. If we can produce an article like artificial silk—a purely chemical product—and find such a vast use for it, is it not just conceivable that chemical science may eliminate cotton for the whole textile industry of the country? That is not a practical suggestion; I am only pointing out some of the lines of thought which chemists and the dyeing industry have got to bring upon the great problems of the world."

Proceeding to deal with the sources of supply of chemicals, Sir Max said that so long as the sea between Spain and England was open there was no reason to fear for sulphuric acid. There was also a useful adjunct at home in the spent oxide at gas works; and manufacturers were doing everything to encourage it. In regard to acetic acid and carbonate of soda, we were self-contained. Heavy chemical manufacturers had every reason to believe that there was no country where the conditions were such that cheaper acetic acid or cheaper carbonate of soda could be manufactured. On a balance of years, even at the present moment, the actual consumer received his products as cheaply as the consumer in any other country. Intrinsically they were on rock bottom in this country as far as alkali was concerned. Very much the same remarks applied to bleaching powder solution, except that there were enormous possibilities in the better utilisation of the chlorine which the heavy chemical manufacturer manufactured. It was a very open question whether large consumers of bleaching powder were not paying to the railway companies, and the makers of wooden casks, etc., an unnecessary amount of money, because the view of many was that the right method for bleaching powders for users of any considerable quantity—was to buy liquid chlorine and make the liquor upon the spot themselves.

Industrial Partnership

That question was one of which the partnership between the dyeing, textile, and chemical industry might be of real advantage in helping to reduce costs, and placing each one of the industries upon a more certain basis than it had been in the past.

Coming to the whole range of mordants, Sir Max said that potash was the only national "snag." The only real economic source of potash was the Stassfurt mines. During the war they got through by other means, and there was never any real shortage, but potash was one of the weak spots in our economic system which it would be wise for all concerned to watch.

England was not only not self-supporting in acetic acid or acetates, and it was almost entirely dependent upon other countries. Fortunately the risks were pretty evenly divided. There was a solution in sight though it was not an economic one. More acetic acid was made at present by the synthetic process than by any other means, and it had come to stay. At the same time, he did not think it would be wise to allow the other source to vanish. It was up to either the dyeing industry or the chemical industry to see that at any rate a nucleus of synthetic acid was made in this country. At the moment it did not matter; but let them bear in mind a real source of danger which would arise in the textile and dyeing industry if they ever found themselves cut off from that overseas' supply of acetic acid or acetates, and had not even the knowledge in the country of how to set about putting things right. It was conceivable that he might think it his duty to have a solution dealt with on uneconomic lines, but it would be an entirely self-imposed duty, and he suggested that they might think out the economics of acetic acid and what it would be worth to them to have a small synthetic works in this country, with a certain output and capable of rapid expansion in time of crisis.

Atmospheric Nitrogen

The same remarks applied to nitrate, except that this was being dealt with. It was never in any danger during the war, but to make assurance doubly sure large chemical works had been erected at Billingham for atmospheric nitrogen, and in case of necessity these could be rapidly extended so that if all supplies were cut off we should be inconvenienced in only a slight degree.

Speaking of the dyeing industry, Sir Max said that each one of the steps by which it had been built up had been in association with the heavy chemicals. A dyeing industry without a heavy chemical industry was impossible and unthinkable. At every step the dye manufacturer and the heavy chemical manufacturer must march side by side, with a full knowledge of one another's problems, it anything like the best results were to be obtained.

On the heavy chemical side, said Sir Max in conclusion, they might take it that this country was in a position to meet any competition in the world and to supply the dye industry with what it required upon reasonable terms. The question of reasonable terms was the real test of partnership. The ordinary old-fashioned haggling was not good enough. There must be an interchange of ideas, and the heavy chemical manufacturer should have sufficient information to enable him to give the best advice to the dyer.

The Value of Co-operation

It might so easily happen that because the best knowledge of the heavy chemical manufacturer was not available to the dyer, and *vice versa*, that both would work, perhaps not on uneconomic lines, but not on the best economic lines, blaming each other, and one saying that the price was far too low, and the other that it was far too high. By comparing notes in 60 per cent. of the cases it would be possible to find an economic advantage to both without any friction.

Answering questions, Sir Max said that there was no manufacturer of nitrate in this country, but he did not think there would be any difficulty in time of stress. It was an important minor problem. In regard to progress in the manufacture of synthetic ammonia, he said that large works were commenced during the war and had now been taken over by Messrs. Brunner, Mond, who would not fail. That there would be synthetic ammonia he was certain; whether it would be profitable was another question. In regard to potash, seaweed was one source of manufacture. It was bound to be expensive to collect seaweed in order to make a few hundred weights of potassium chloride, but it could be done, and the plant was in existence. The same remark applied to the extraction of potash for steel furnaces.

Sir Max was thanked on the proposition of Mr. Ernest Hickson, seconded by Mr. Leonard Ingham.

Thirty Years in the U.S.A. Benzol Market

Remarkable Increase of Production

Mr. D. W. Jayne, in the current issue of "Drug and Chemical Markets," reviews the conditions of the American benzol market, in which he has been engaged for thirty years, pointing out the remarkable increase in benzol production since the outbreak of the war.

BENZOL was first used in the production of aniline oil, but various grades were prepared for use as solvents and found application in the rubber and varnish industries. For such solvent purposes, benzol was considered as comprising also its homologues, toluol and xylol. In fact, the commercial grades of benzol used as solvents were merely the lighter distillates of coal-tar separated into several arbitrary fractions according to the temperature of distillation. For instance, the lightest portion was cut from the distillate so that 90 per cent. would distill under 100° C., and was therefore called 90 per cent. benzol. Another fraction began to distill about 130° C., and was 90 per cent. off at 160° C. This was called 160° benzol. These two grades became the accepted commercial articles for solvent purposes and were particularly used in quantity by the manufacturers of rubberised fabrics, such as "mackintoshes." The production was entirely from the light oil distilled from coal-tar.

The early demands for benzol in this country were met by importation from England, thereby establishing here the same two principal grades for solvent purposes, together with a C. P. benzol for particular work in the production in a small way of a few intermediates, principally nitrobenzol. When tar from coal gas plants was distilled in the United States, a small amount of the light oil was used for the preparation of very small quantities of benzol. This was the first procedure for the commercial production of benzol in the United States and was during the late 80's. A few other raw materials were found which were rich enough in benzol to be used as a source for it. Notable among these was the "Hydrocarbon" which is condensed from compressed Pintsch gas. For at least a decade preceding 1908 this material represented the principal source of the American produced benzol. The principal source of solvent naphtha was the oil condensed in the gasholders and distributing mains.

It must be remembered that the uses for benzol up to about 1910 were comparatively small. There was practically none used in the chemical industry, for instance, for the manufacture of intermediates, and its use in the manufacture of rubber tyres came with the automobile. Probably the first use which required a notably large portion of the production was in the benzol-alcohol varnish removers. That was about 1900. The next development was the use in the cement used in the sanitary cans. These are food product cans on which the top is sealed by a layer of rubber cement to make them air-tight. The American production was insufficient at times to take care of the increased consumption due to this use. Following this outlet, the use in artificial leather became a factor which has developed together with the use in the manufacture of rubber tyres, as the automobiles have consumed ever increasing amounts of such materials for upholstery.

Unequal Demand

The relation of production to consumption between 1900 and 1914 was a veritable see-saw. Demand would exceed supply for six months; then, due to increased production and the filling of the gap, in some cases by importation, supplies would be in excess for a time. This was particularly true when light oil, stripped from coke oven gas, was first recovered. For a while supplies increased faster than demand, so that by the end of 1911 a considerable surplus was on hand. This caused the first export in bulk to be arranged early in 1912, but the see-saw had reversed again, and, following the removal of this excess, a shortage again became imminent, and this condition continued practically unaltered until 1914.

During the time that a surplus seemed inevitable (1911), a number of private trials were made with benzol as a motor fuel. Other and earlier trials of some grade of benzol had been made, but the continued use of benzol began at that time in at least two cities, which lasted until the war made benzol too high priced a commodity for fuel. This use of benzol for motor fuel was with the 90 per cent. grade, and in most cases was used straight, not mixed with petrol, and thoroughly demonstrated the practicability and the advantages of benzol for that purpose.

In 1914, when war broke out in Europe, the entire plan of operation of the benzol refiners had to be changed. In the first place, the demand for toluol caused every producer to recover the last drop possible of that valuable product. Secondly, the demand for the pure benzol for the manufacture of synthetic phenol, aniline oil and other intermediates made it desirable to split up the old 90 per cent. grade into its principal constituents, benzene and toluene.

In 1914, the principal source of benzol was the light oil recovered from coke oven gas, but only one company (at several plants) was carrying on this operation; the others were burning the gas without stripping it. The demand, however, soon caused a general installation of benzol recovery and refining plants at the ovens, so that by 1918 every by-product coke plant in the country was recovering these valuable products.

Conditions after the War

The end of war saw another complete change in conditions. While a considerable use had been developed for the manufacture of intermediates, which did not exist before the war, the more general uses suffered probably a slight drop because of the many cases where substitutes were adopted of necessity during the war, and in some cases were adhered to afterward. However, the situation which developed, with supplies about four times demand for all previous commercial purposes, had not been unforeseen, and plans previously developed were immediately acted on to begin the distribution of benzol as an ingredient of motor fuel. This use of benzol as a constituent (about 40 per cent.) of benzol-blend motor fuels has been completely successful, and now instead of a "dumping" outlet is such a ready outlet, and also relatively profitable, that it threatens to curtail the necessary supplies of pure benzol for intermediates and of 90 per cent. benzol for solvent purposes.

The old arbitrary grade designated 90 per cent. years ago in England is still to-day the standard for use as a solvent. The old 160° benzol still exists but under the newer name of solvent naphtha, but still these two grades predominate—omitting consideration of motor fuel which is usually the entire light oil fraction up to 170° C.

The growth in quantity of production from 1904 is shown below. Statistics for the years before 1904 are not available, but the quantities were obviously small. These figures include all grades of benzol, including solvent naphtha. Before 1915 the solvent naphtha was probably one-third of the total, whereas since the war it is nearer 5 per cent. of the total. This is due to the fact that the material used now (coke-oven light oil) contains much less higher boiling products than the coal-tar light oil and Holder oils which were formerly the principal sources. Also, motor benzol contains a large portion of the solvent naphtha which is not separated.

Benzol Production in U.S.

	Gallons		Gallons
1904	285,000	1912	2,300,000
1905	360,000	1913	3,000,000
1906	400,000	1914	3,000,000
1907	375,000	1915	9,000,000
1908	485,000	1916	27,000,000
1909	885,000	1917	38,000,000
1910	1,500,000	1918	55,000,000
1911	1,600,000	1919	63,000,000
		1920	70,000,000

Price records are available from 1890. The earlier figures (1890–1903), however, are from a record of the English market, and are approximate only for the United States, the market here being usually very slightly higher. The fluctuations in the earlier years were very great, even within the year. In 1897, for instance, the maximum was 96c per gallon and the minimum 29c per gallon. The prices given are the

approximate average of all grades and are on the largest quantity selling price basis :—

	Per U.S. Gallon		Per U.S. Gallon
1890	75c	1905	32c
1891	72c	1906	30c
1892	35c	1907	32c
1893	30c	1908	27c
1894	22c	1909	17c
1895	19c	1910	18c
1896	42c	1911	19c
1897	39c	1912	19c
1898	15c	1913	20c
1899	12c	1914	20c
1900	12c	1915	42c
1901	15c	1916	63c
1902	12c	1917	50c
1903	15c	1918	25c
1904	33c	1919	20c

In 1915, 1916, 1917 and 1918 the prices were exclusively for pure benzol. Previous to 1915, 90 per cent. benzol was the principal factor in determining price average. Since 1919 and for the future, on account of the large proportion of benzol used for motor fuel, the price of gasoline fixes the basic value. Depending on the grade, benzol sells from prices equivalent to tank wagon on gasoline in the principal cities up to 10c per gallon above that base for the pure grade of benzol.

During 1921 and 1922, approximately 90 per cent. of the quantity of light oil was produced as compared with the figures for 1920. Some of the larger companies found little difficulty in securing coal for their coke ovens during the shortage, and, as a consequence, many have kept production up to 95 per cent. Many of the smaller plants, however, did have coal difficulties, and it is believed that their figures were lower. An average production of about 90 per cent. for benzol in 1921 and 1922 is a fair estimate.

British Glues and Chemicals

Improved Position

THE third ordinary general meeting of British Glues and Chemicals, Ltd., was held on Wednesday at Cannon Street Hotel, Cannon Street, E.C.

Mr. T. WALTON, F.C.A., chairman of the company, presided, and in the course of his speech said : " The year covered by the accounts has been a very difficult one for commerce generally and conditions are still far from normal. Your board is not satisfied with the results and yet feels some gratification that a loss of £64,000 last year is turned into a profit of nearly £36,000, and that our works have been brought up to a very high standard of efficiency. It is that condition of efficiency, coupled with the energy and initiative displayed by our officials and staff, which encourages our belief that only the abnormal condition of the world's markets stands in the way of our making satisfactory instead of meagre profits.

" The company's holdings in subsidiary companies are yielding a good return and your directors can assure you that such holdings are worth more than the £69,402 10s. 11d. at which they stand in the balance-sheet. Stock-in-trade, is, as usual, valued on the basis of cost or market price whichever was the lower at the date of stocktaking, and debtors and debit balances are soundly valued, full provision having been made for bad and doubtful debts. Our depreciation reserve account has grown to the respectable total of almost £100,000, and profit and loss account stands in credit £78,469 7s. Unfortunately, however, this latter figure calls for a very important comment, as indicated in the director's report in your hands. At our last meeting you very naturally asked me to inform you of the approximate amount of our taxation liability, and it was, and still is, a matter of personal regret to me and my colleagues that our advisers, having regard to negotiations with the revenue authorities still proceeding, advise that such information cannot be given. It only remains for me to add that every possible step which has the approval of our professional advisers shall be taken, and to give you my personal assurance that immediately a settlement has been arrived at, a communication shall be addressed to you informing you of the amount of that settlement. It is proper that I should anticipate an inquiry as to our general financial position by reminding you that there are no mortgage or debenture charges on any of our assets. Though the Government claims when agreed, will in any event call for a large sum of money, appropriate arrangements have been made, and it is very improbable there will be necessity for us to raise any further capital, and you will have noticed that the value of our liquid assets exceeds our liabilities apart from balance of taxation by £276,000.

Improved Organisation

" We have suffered, in common with most other industrial concerns, from the abnormal times, and it would be foolish for me to speak in a tone of unqualified optimism regarding the immediate future until the European and world economic conditions are more settled. There has, however, been continued improvement in the organization of our factories—from which our production during the past year has been greater than ever previously obtained, either since amalgamation or by the separate factories prior thereto—and in our selling organization throughout the world, and, notwithstanding that European exchanges have moved adversely to the manufacturers of this country since I last addressed you—with the consequence that competition in meeting the reduced requirements of consumers has been extremely severe—we have sold the whole of that production at some profit. This has only been done by incessant vigilance on the part of a vigorous sales organization, which, baulked in many channels, has found its outlets by going farther and farther afield until there are few countries in the world where our productions are not becoming increasingly well known.

" If ever it were true in business that everything comes to him who waits, it certainly is not true to-day. But we are not waiting ; not only are we following every natural outlet for the sale of our goods but we are pooling our specialized knowledge with that of our customers, and with the aid of our own research facilities, increasing the uses to which our commodities can be put ; and our relationship with our customers, and even with our competing manufacturers, to whose goodwill we attach much importance, is cordial.

Economy and Efficiency

" Because of the comparative newness of our company we have received no aid from excess profits duty repayments to help us through the slump and period of falling prices, and to have accomplished what has been done is due in the main to the ability and unceasing efforts of our managing director and the loyal co-operation of the whole of the company's officers and employees. Your directors have again unanimously resolved to forgo their fees, your managing directors have invited reduced salaries with commissions dependent upon results, and the chief officials have similarly met the position, and every further economy which can be effected without impairing efficiency has been put into operation. (Hear, hear.) In proof of this statement it must be pleasing to you to know that even the least efficient of our factories is now obtaining better process results than the most efficient prior to the pooling of experience and knowledge as the result of amalgamation, and the fullest advantage of the geographical position of our works has been taken with the object of reduction in rail charges to the minimum.

" When I tell you our rail charges approach £100,000 a year, you will appreciate that amalgamation has made possible the effecting of large savings ; good railway facilities and reasonable freight charges are of vital importance, and every opportunity is taken to bring this home to the railway companies.

" This country cannot meet foreign competition on a basis of complete equality so long as other European rates of exchange are continually declining. To cope with that adverse factor our aim must be improvement in quantity and quality of product per unit of our man power.

" From the date of our amalgamation we had about half a year of profitable conditions (on which the Government excess profits duty claims are based) followed by three years of the worst continuous depression ever experienced ; yet during that period our company has written off the preliminary expenses, £57,000, built up a depreciation reserve fund of approximately £100,000, and turned last year's loss of £64,000 into a profit this year of about £36,000. The situation requires continuance of patience on your part and vigour and initiative on ours, and, though dividends have been postponed by the operation of circumstances outside our

power to control, I have confidence that the ground work which has been accomplished must result, in times of normality, in success resting with us.

"Two of the retiring directors, Mr. W. B. B. Quibell and Mr. Walker, have decided not to seek re-election, but I am glad I can assure you that their decision is by no means due to any differences which have arisen. Your board does not recommend that their places be filled, and, assuming this recommendation has your approval, you will be asked formally to authorise a reduction in the number of the board to twelve. The company's articles provide for a board consisting of a minimum of twelve and a maximum of thirty directors, and your board recommends that the minimum and maximum be reduced to seven and fifteen respectively, but this decision also will call for your attention by way of a separate resolution."

The report and accounts were unanimously adopted.

A New Automatic Glass Bottle Machine

An Ingenious Furnace

At a meeting of the Society of Engineers at Burlington House, London, on Monday, October 1, Mr. Alexander Ferguson gave a description of the new automatic machine for mass production of glass bottles, for which he has prepared designs. The machine was described at the last annual meeting of the Society of Glass Technologists and has been given the name of the Cyclone system, the claim being made on the present occasion that the machine allows 540 tons of glass to be made in 168 hours per week, or 120 bottles per minutes, whilst, so Mr. Ferguson said, ordinary tanks deliver from 120 to 170 tons to serve machines with a limit of 30 to 48 sixteen-ounce bottles per minute. Further, it was pointed out that, whereas these tanks usually require 100 tons of coal to 100 tons of glass, and in best practice to date a great achievement has been 60 per cent. coal to glass under highly efficient technical supervision and advice, it is possible, with the Cyclone furnace, to use only 30 per cent. coal to glass, with a safety margin of 13½ tons in each 100 tons glass in a furnace occupying 600sq. ft., instead of the present 8,800 sq. ft., and yet leaving the ground area clear for any other purpose. Another feature of the plant is that it is claimed to be entirely automatic throughout, no skilled labour—outside the machine repair shop—being required after the chemist or glass maker has settled the batches for the glass required. It should be pointed out that these machines have not yet been made on a commercial scale, the author admitting his inability to find a firm to take up their manufacture or to work them.

The principal feature of the furnace is that the burners are so set as to give a whirling motion to the gases which travel about 175 ft. per second and whirl round seven times. The walls of the furnace are inclined from top to bottom and the batch material is ground to a mesh of 60 on an average. Into these whirling gases the batch material is fed, and the author's description of the operation is that the molecules of glass, once formed, are cast forth from the whirling gases and coalesce into a liquid homogeneous paste and flow down the walls of the furnace like glucose under the influence of radiant heat. The glass passes on to the forehearth, from which it is gathered and delivered to the bottle forming plant. The design of furnace has been evolved in trying to get at an economical method for the manufacture of giant telescope lenses of perfect homogeneity. The funnel of high temperature whirling gases seemed to the author to open the way to melting high temperature materials instantly into a homogeneous mass. The idea was that the globular paste thoroughly amalgamated without stirring, or any external action, would fall into a temporary tank and remain there until completely annealed *in situ*, and the crude lens extracted for grinding and polishing.

Application to Glass Manufacture

Applying this principle to the manufacture of ordinary glass, it is said that the batch materials ground to a 60 mesh present some 6,300 times more surface to the heat for each cubic centimetre of batch than if the batch was dealt with in the ordinary way. The waste gases from the furnace are used to pre-heat the batch to 800° C. The heat of the flame in the furnace is 1,800° C., and it is alleged that the glass paste in the furnace acts as an armour plating against abrasion and soda action on the bricks, at the back of which is a heavy filling of brick dust and Kieselguhr, between them and the iron casing, thereby reducing the outer surface to blood heat and the radiation loss to one-seventh of the otherwise radiation losses. The next portion of the apparatus is that in which the molten glass is sucked up automatically and transferred to the moulds, which are mounted on the periphery of a large wheel. These rotating gatherers are so arranged as to suck up the desired quantity for the particular size bottle. The other component is the producer for working the furnace.

It is claimed that the plant is simple, entirely automatic and virtually fool-proof, since it wants no handling in operation and, if kept clean and well polished, would have a very long life, as the parts are few and can easily be replaced at any time if needed. The total capital cost of such a plant is put at less than that for a plant of one-fourth the size of the ordinary type. An interesting discussion followed, in which one or two minor details of operation were considered. If there were no unforeseen difficulties in operation it was agreed that the device would revolutionise glass manufacture. Mr. Ferguson, in reply, said that the only difficulty likely to arise was overheating, which would be prevented by an air douche.

Is the German Dye Trade Recovering?

According to Mr. F. E. Breithut's report to the U.S.A. Chamber of Commerce, the German coal-tar industry has been hit hard by the treaty of Versailles. Twenty-five per cent. of the total current production must be delivered on account of reparations. It is claimed that up to January 10, 1922, there were delivered 7,150 tons. In accordance with a supplementary agreement the following quantities of dyes are also said to have been delivered :—

	Metric tons
United States	40
Belgium	135
England	74
France	27
Italy	24

The production of dyes after the war reached a height of 80 per cent. of the pre-war production. Because of the Ruhr occupation, the production has decreased considerably, and in June, 1923, it was estimated to be only 30 per cent. of the pre-war production. The factories still are shipping goods abroad, but the new orders which are now being received cannot, it is said, be executed, partly due to the seizures and occupations by the French and partly on account of the difficulties connected with the congested and disordered railway traffic in the Ruhr district. The considerable fluctuations in prices of raw materials and finished products also choke off the activities of enterprising manufacturers. It is stated in Berlin that even the demands of the buyers in the occupied district itself, which are not large, could not be satisfied at present.

Eighty per cent. of the German dye industry is in the occupied district. One of the official export boards is in Berlin. A second board was located in Ems, near the centres of production. The Ems board controlled about 65 per cent. of all exports, against 35 per cent. handled by the Berlin board. When the French took the Ruhr district under control, the export control board at Ems was taken over by them. The following table shows the German exports of coal-tar dyes during the first four months of 1923 :—

German Exports of Synthetic Coal-Tar Dyes, January-April, 1923 (in metric tons).

	Jan.	Feb.	March	April
Aniline dyes, n.e.s.	3,361	3,329	2,958	2,552
Alizarine and alizarine dyes	185	189	232	53
Indigo	1,222	926	900	239
Indigoids (colour lakes, etc.)	5	18	12	—
Total	4,773	4,462	4,102	2,844

The plants located in the unoccupied territory are at present working day and night (three shifts of eight hours) to make up for the smaller production in the Ruhr district.

A Power Station as an Exhibit

A Feature at the British Empire Exhibition

WORK has now been started on the huge electric power station which is to supply the British Empire Exhibition next year at Wembley with both driving power and light. An enormous amount of current will be needed for lighting the numerous great buildings that are being erected, and for driving the machines, lifts, general services, and amusements to be installed. The Power Station is itself to form one of the exhibits in the Electrical and Allied Industries Section of the Palace of Engineering. Visitors will be invited to inspect the station, and see for themselves what British firms have to offer in the way of plant for generating and supplying electricity. A special gallery is being built from which visitors will be able at all times to view the machinery at work. The requirements of the Exhibition demanded a highly efficient generating plant, and the British Electrical and Allied Manufacturers' Association, whose members include all the leading makers of power plant, decided that the products of these firms could most effectively be displayed if seen actually working. The Association have accordingly assisted the Consulting Engineers in planning the erection of the power station on lines that will make it representative of some forty electrical manufacturing firms.

The Work of Different Firms

The power station will be situated on the northern side of the Palace of Engineering. The main features will be three fifteen hundred kilo-watt turbo generators of the most recent type, supplied with steam from two different types of water-tube boilers. Each of these generators will be the work of a different firm, and in the same way the condensing plants, air filters, rotary converters, transformers, cooling towers, switch-gear, batteries and so on, will be of varying makes. For purposes of demonstration, a very important section of the industry is showing other forms of power producers. In the main hall, though not actually in the power station, there will be exhibited a slow-speed steam set and a horizontal internal combustion set, each generating 300 kilowatts. These will be run under load on stands, and will be coupled up to the body of the plant through panels on the main switchboard.

The whole of the electrical and allied engineering section has been organised by the B.E.A.M.A. The area which it covers is the enormous one of 4½ acres. Into that space will be crowded exhibits forming a complete catalogue of the industries represented by the Association. With very few exceptions, every branch of the industry is exhibiting, each branch being represented by a number of firms. Some concerns have taken as much as from 4,000 to 8,000 square feet for their stands. Over two hundred firms in all are participating in this section, and the result will be a spectacle full of interest.

Railway Rates Compromise

THE Federation of British Industries makes the important announcement that its efforts to bring about a general reduction in railway rates, satisfactory to the trading community, have been successfully concluded. Applications against the rates of the four group railway companies were lodged by the Federation with the Railway Rates Tribunal on July 19. The Federation asked for (*a*) a general reduction of rates and charges to 50 per cent. above the level prevailing on January 14th, 1920, and (*b*) the abolition of the flat-rate additions. The Federation indicated to the companies that if they would make an immediate reduction, as asked for, under (*a*) and would give an undertaking that the traders would not be prejudiced in any action which they might desire to take against the flat-rate additions in the future the applications would be withdrawn. The reductions asked for were brought into operation at the beginning of August, and the undertaking as to the flat-rate was given by the London Midland and Scottish Railway Co. on July 31. The arrangements for a similar agreement with the other three companies have necessitated a little more negotiation, partly owing to the holiday season occurring. Satisfactory undertakings, however, have now been received from these companies, and the applications against them will be withdrawn forthwith.

British Commercial Gas Association

ALDERMAN J. H. LLOYD presided at the 12th annual conference of the British Commercial Gas Association which opened on Tuesday at Birmingham. The Lord Mayor (Sir David Davis) accorded a civic welcome.

In his presidential address, Alderman Lloyd said that the gas industry had behind it a history of which it might justly be proud. He was particularly struck at the opening ceremony of the National Gas Exhibition by the remarks of Mr. Milne Watson regarding the debt that civilisation owed to Murdoch and those who followed him in building up the gas industry. Apart from the marvellous manner in which coal tar derivatives entered into medicinal and surgical science, we must remember that the motor car was made possible by the invention of the internal combustion engine, to which work Sir Dugald Clerk contributed so wonderfully; that the motor-tyre industry would not have been commenced but for the solvent naphthas obtained from the distillation of coal tar; that extensive motoring had been made possible only by the application of refined tar to our roads; and that the motor industry therefore owed its important position to-day to the existence of the gas industry, and the pioneer work of its engineers and chemists. When they thought also of the dyes, perfumes, and the thousands of other articles that owed their birth to the carbonisation of coal on gas works, they began to realise how many of the amenities of our life to-day could be traced to Murdoch's wonderful work and all those enthusiasts who succeeded him. The service of the gas industry to the community in other directions should be emphasised; the improvement of conditions in the home by the reduction of dirt and drudgery; the greater ease, speed and certainty of cooking which had meant so much to the working man and his wife, enabling the meals of the day to be so easily prepared, and contributing to health through the provision of properly-cooked food. They had installed in Birmingham well over 100,000 cooking stoves in connection with pre-payment meters in artisan dwellings, and it could be realised what a boon these appliances were to the consumers. During the period of the recent coal dispute the widespread use of such gas apparatus literally saved the lives and preserved the peace of the community.

Presentation to Professor Green

UPON his final retirement from the post of director of research to the British Dyestuffs Corporation, Professor A. G. Green, on Friday, September 28, was presented by his staff of thirty chemists with a handsome library chair as a token of respect and deep regard for him as a chemist and a leader. In making the presentation, Mr. G. H. Frank referred to Professor Green's pioneer work in the field of colour chemistry and his constant and consistent advocacy throughout his life of a progressive research policy as the only possible basis for a stable British dyestuff industry. Mr. H. F. Oxley, who followed, characterised Professor Green's loss to the Corporation as "dropping the pilot," and considered that the industry could not afford to dispense with his services. In a short speech, in which he bade farewell to his staff, Professor Green thanked them for their devoted service, both to himself and to the Corporation. Their work would bear its fruit eventually, and he greatly regretted the policy of the Board which had made it imperative upon him to take the step he had.

Cast Iron to Resist Corrosion

THE recent announcement by the British Cast Iron Research Association that research on cast iron has been instituted to determine the factors affecting corrosion has been welcomed by a large number of their members, and this shows the necessity of it being carried out. Interesting data has been sent in, from which it is evident that the purposes for which cast iron is required to resist corrosion are fairly large; they include piping, ship propellers, submersible motors, submarine junction boxes, electric heating apparatus, iron clad and other switch gear for ship use, ship fittings, pumping plant of all kinds, condensers, turbine cylinders, parts of internal combustion engines, etc. Such a research will therefore be of great interest and value to all classes of engineers, chemical and otherwise. The corrosion problem, despite many attempts to explain the phenomena, is a long way off being solved, and the Association is worthy of support in tackling this matter.

The Manufacture of Gas Mantles

A Visit to the Welsbach Factory

AT the invitation of the Welsbach Light Co. a representative party of the Press was enabled to make a tour of their factory at Southfields, on Monday. The factory itself is a model of light and cleanliness, and one is first introduced to the spinning and spooling of the yarn which forms the initial foundation of the fabric. Anything up to a 65 yarn fabric is dealt with, and to the layman the result is that of an ordinary loose-knitted stocking. A finer yarn of artificial silk is also knitted, and, following roughly the same process of the ordinary yarn, ultimately resolves itself into a finely woven gas mantle of exceptional brilliance. The next process is the important one of dipping and cleaning, and for this purpose the spun yarn is immersed in a solution of hydrochloric acid, and is then passed through a weak solution of ammonia. The artificial silk is dealt with separately, and receives a strong solution of ammonia. A drying process next takes place in an atmosphere of 120°, after which the knitted material begins to receive some drastic treatment.

Ingenious Machines

The material is now immersed in a bath of thorium nitrate and, after partial drying, weighing and checking, passes on to the cutting and sewing section. It is here where the inverted type are strongly fastened to the rings, and the uprights are specially dealt with to give the tops additional strength. Some ingenious threading machines are introduced in these stages, but with regard to outstanding sizes—such as for lighthouses—the various stages of manufacture are conducted by hand throughout. The material may now be handled at pleasure, but the next process, after the tops of the uprights have been secured with asbestos and the inverteds have their rings affixed, reduces everything to a fine ash, an ingenious system of ovens burning off the yarn and leaving that delicate fabric which the homely user knows so well. In order to protect the mantles in the long travel which lies before them in their journey to the individual user they receive a bath in collodion, which imparts a certain amount of rigidity. They are then packed carefully away in their neat cartons, and eventually find their way to the homes of the man in the street and the big gas-using municipalities.

History of the Industry

At a luncheon which followed this tour Mr. J. R. Yates, the chairman of the company, welcomed the Press on their first visit to the factory, and briefly summarised the early history of the gas mantle. He stressed the point that the use of collodion enabled them, as large manufacturers, to send their products throughout the world, and further emphasised the point that their output was entirely British throughout. Enthusiasts maintained that the gas industry has been able to withstand the onslaught of electricity only by the up-to-date methods of the gas mantle manufacturers. One great point Mr. Yates very ably brought out was the danger of foreign competition, and he mentioned that no fewer than 108,788 gross of mantles have been imported into this country since the beginning of the year, notwithstanding the provisions of the Safeguarding of Industries Act.

The Mechanism of Gas Ignition

A PAPER entitled "The Mechanism of Gas Ignition" was read by Professor W. M. Thornton on Wednesday, September 19, before Section G (Engineering) of the British Association at the Liverpool meeting. It was pointed out that the two modes of spark ignition used in engineering are by disruptive discharge at high voltage and by the arc formed at the point where a circuit is broken. The former is a well-known case of ionisation by collision, but ignition does not depend solely upon the sparking voltage. There is for each inflammable mixture a certain intensity of spark necessary for ignition. Below this it is possible to pass sparks indefinitely without explosion resulting. A certain rate of production of ions is necessary, which bears little or no relation to the total energy dissipated in the spark. Ignition occurs when a critical rate of electrical activation of the combining gases is reached.

The case of the momentary arc at break is less simple. That it is mostly ionic and not thermal has been shown by a long series of observations, in which wide but regular differences between the ignitions of various gases under varied electrical conditions have been found. Recent observations on the ignition of hydrogen-air mixtures give more direct evidence of its nature. Working with alternating currents at a frequency of 250 a second and a circuit voltage of 85, the following were regularly obtained: After breaking a 10-ampere circuit fifty times in air alone, iron poles being used, ignition of a 35 per cent. hydrogen-in-air mixture occurred with a circuit current of 0.4 ampere. After sparking freshly cleaned poles the same number of times in pure hydrogen, ignition of the 35 per cent. mixture could not be obtained with less than 6.0 amperes, giving a large thick arc. It is clear that this kind of ignition also does not depend upon the energy of the arc, which is 225 times greater in the latter case. Heating the metal in hydrogen to arc temperature destroys that which causes ignition of a subsequent explosive mixture. The direct and only chemical effect of heating iron in pure hydrogen is to reduce an oxide film or to burn out oxygen absorbed in the surface. In cooling, hydrogen may be absorbed; if so, its presence greatly retards ignition, though it facilitates electron discharge.

The evidence is that ignition does not depend upon the heat energy of the arc, nor upon the total electron discharge, which is greater since the current is so much larger, but upon the emission of that which is suppressed by the hydrogen. This can only consist of oxygen normally absorbed or absorbed by the poles in contact with air and activated by the combined effect of the thermionic discharge and strong electric field at break.

Progress of British China Clay Industry

A DEVELOPMENT of prime importance to the Cornish China Clay industry was inaugurated on Thursday, September 27, with the opening by Lord Mildmay of Flete, one of the directors of the Great Western Railway Co., of the new jetty which the company has constructed at Fowey to facilitate the shipping of the clay. The world demand for China Clay is greatly increasing, and the output of the clayfields has now nearly reached normal, averaging over 60,000 tons per month for the first eight months of this year. American requirements are responsible for keeping the exports at a high level, and the prospects are that the shipments to the United States this year will be above the average of pre-war years, and considerably exceed the 1922 total, when the exports amounted to 290,000 tons. Further accommodation at Fowey has been urgently needed for years; in fact, the construction of the new jetty was begun in 1914, but its completion was delayed by the war and the trade slump which followed. The normal capacity of the new jetty and conveyor will be 100 tons per hour, but it can deal with a much larger quantity than this, and it is confidently hoped that with the additional facilities now provided Fowey will be enabled this year to ship a record quantity of the clay. In the course of his remarks, Lord Mildmay made the welcome announcement that the whole of the loading and unloading charges, now standing at 125 per cent. over pre-war rates, would be reduced to 100 per cent. on and from the following Monday, these charges including the special ones made for loading at the electric jetties. Mr. R. T. Smith, the engineer principally responsible for the construction of the new jetty and works, observed that the China Clay trade was fortunate in being able to ship from what was the cheapest port in Great Britain. He threw out a suggestion to the producers that it would be well worth their while to consider the question of a scheme for securing cheap electric power in bulk for the industry.

An illustrated account of the developments at Fowey will be given in *The China Clay Trade Review*, issued with THE CHEMICAL AGE, on October 20.

British Industries Fair

THE Department of Overseas Trade states that the voluntary liquidation of the British Industries Fair (Birmingham) Incorporated, in no way affects the London British Industries Fair, organised by that Department. The liquidation of this association, and the transfer of the responsibility for the management of the British Industries Fair (Birmingham) to the Birmingham Chamber of Commerce, will not prevent the holding of the 1924 British Industries Fair at London and Birmingham as usual. The London section will be open at the White City from April 28 to May 9, and the Birmingham section will follow from May 12 to 23.

From Week to Week

AUSTRALIAN IMPORTS from Germany in July, which totalled £83,000, included £8,000 worth of chemical products.

MR. ROY CREPIN, son of Mr. Fred Crepin, has obtained the degree of B.Com. (Lond.), and now joins the firm of Felton and Crepin, 15, Cooper's Row, Tower, London.

PRODUCTION WAS STARTED recently at the plant of the Chile Explosive Co., at Calama, Chile. The Du Pont and Atlas Powder Companies and Nobels, Ltd., are interested in this development.

IN THE SILVER BAND barytes mine, at Hilton, near Appleby, miners recently dug out a crystal weighing close upon 1 cwt. It is composed of practically pure barium sulphate. It is intended to present it to a museum.

THE BRITISH AND FOREIGN METAL AND CHEMICAL CO., LTD., Newcastle-upon-Tyne, announce that they have been granted the sole selling agency for Maastricht lithopones and zinc oxides for shipment to India, Japan, and China.

THE SWISS FEDERAL COUNCIL has decided in favour of ratification of the Opium Convention. Instead of submitting the Opium Bill to the Federal Assembly the Council will ask the Assembly simply to vote for ratification in order to avoid delay.

PAPERS ON "Artificial Silks," by Mr. P. E. King, of Leeds University, and on "The Application of Dyes to Fibres and Fabrics," by Professor J. Thorpe, will be read at the annual conference of the Textile Institute at Leicester, on October 18 and 19.

AN OFFER BY G. and T. Earle, Ltd., cement manufacturers, Hull, to purchase the whole of the issued ordinary shares in the Humber Portland Cement Co. at 30s. 3d. each, has been accepted. The issued capital of the Humber Co. is £60,875 in preference and £381,948 in ordinary shares.

MCVICKER, MORRIS AND CO., LTD., engineers, St. Albans, have secured the contract for supplying the petrol-air gas plants required by the Sudan Government for the Lord Kitchener Memorial Medical School which is now being built at Khartoum. These are for laboratory heating purposes, etc.

THE NAME of the West Cumberland Association of Chemists, Chemical and Metallurgical Engineers has been changed to the West Cumberland Society of Chemists and Engineers, in order to provide a more convenient title. A programme of meetings to be held at Workington during the session 1923–24 has been issued and contains several papers of chemical interest.

ARMSTRONGS AND MAIN announce that the reorganisation of the business has now been completed, and that the name of the company has been changed to A. and J. Main and Co., Ltd. All the company's branches are retained, and the Clydesdale Works in Glasgow and Calcutta Bridge and Roof Works in Calcutta are now more fully equipped than before to deal with all classes of steel structural work as in the past.

THE CONFEDERATION LIFE ASSOCIATION announce that, in order to meet the requirements of the Association's increasing business in this country, new and more commodious offices have been secured, and that on and after Monday, October 1, the address of the head office for the United Kingdom will be Bush House, Aldwych, London, W.C.2. Telephone numbers, City 7367–8; telegraphic address, "Icta, Estrand, London."

THE BRITISH EMPIRE STEEL CORPORATION, it is understood, intends to put into operation the battery of coke ovens erected two years ago by the Koppers Corporation at Sydney, Canada. There are 120 ovens in operation at the plant at present, but according to present plans eighty more will be put into operation. With this extra production the corporation hopes to be able to supply the upper Canadian market with coke for domestic use.

THREE MEN were seriously burned in a fire which occurred on Wednesday at the Brierley Hill (Staffordshire) works of Constable, Hart, and Co., tarmac manufacturers. Tar leaking from a still caught fire, and while the injured men, with others, were trying to damp down the flames there was an explosion, and the men were enveloped in flames. Orders were given to run the tar from the stills in order to prevent any more serious damage.

THE BEET GROWERS' Committee appointed at a recent public meeting at Kidderminster to assist in the inauguration of a beet sugar scheme in Worcestershire announces that arrangements for a factory to operate in 1924 are well in hand. Of the required sum of £350,000 promises for £205,000 have already been received, and provisional arrangements for the supply of the factory machinery and expert assistance for the manufacturing operations have been made.

THE GÖRRES-GESELLSCHAFT, the well-known society for the advancement of science, founded in 1876 on the centenary of the birth of J. J. von Görres, the eminent Catholic scientist, has adopted a resolution calling the attention of persons interested in science in foreign countries to the decadence of German science, the deficiency of young people prepared to devote themselves to science, and the growing distressful condition of research institutes in Germany.

TO DEAL with increase in business and to give improved local service, the Brush Electrical Engineering Co., Ltd., Falcon Works, Loughborough, announce that they have opened offices at Sheffield and Birmingham. The Sheffield office is under the management of Mr. C. E. Brotherton, at 32, White Building, Fitzalan Square. The telephone number is 5277. Telegrams: "Turbine," Sheffield. The Birmingham office is under the management of Mr. Malcolm Brown, at Phœnix Chambers, Colmore Row. Telephone No.: 5799. Telegrams: "Colbree," Birmingham.

A PRIVATE MEETING of the members of the Bradford Chamber of Commerce was held on Monday to consider an offer by the Piece Dyers' Association of a 10 per cent. rebate to manufacturers and merchants of cotton and artificial silk goods on the condition that traders send all dyeing orders to the Association. The meeting declined the offer, and requested the Piece Dyers' Association to withdraw and suspend the operation of this proposal pending negotiations. The meeting also urged that dyeing prices generally should be reviewed and reductions in prices made unconditionally. A deputation will wait on the Piece Dyers' Association.

DURING the month of September, Meldrums, Ltd., engineers, Timperley, near Manchester, dealt with 29 orders for forced draught furnaces, to be supplied to bleachworks, brickworks, collieries, motor manufacturers (a repeat order), engineers, sizers, a county hospital, laundries, tar distillers, chemical works, a residential hotel, tanners, brewers, gasworks, and economiser makers. In addition, they have received orders for four destructors for various users, including manufacturing chemists; two gas washer-scrubbers of 5 million c. ft. capacity each, and two of 10 million c. ft. capacity each for coke oven plants; and also elevators for wood pulp for a big paper factory.

IN THE Mayor's and City of London Court on Monday, before Judge Shewell Cooper, a case was heard in which the Initial Carrier Co. had recovered judgment against the United Laboratories and Chemical Co., Ltd., for £12 2s. 10d. for a carrier supplied, and when execution was levied, the goods were claimed by the Tele-Dis Services (Founders Co.), Ltd., 97, Queen Victoria Street (a company formed for disinfecting telephones), whose claim was now adjudicated upon. Mr. Goodman, for the claimants, said that both the defendant and the claimant companies shared offices in the same building, but the United Laboratories Co. had nothing on the premises belonging to them. The judge said he was satisfied that all the furniture seized belonged to the Tele-Dis Services Co., having been purchased by them. The claimants had established their claim, which he allowed with costs.

MR. H. E. CARR, secretary of the British Analytical Control, in a letter on the subject of chemical preservatives in food, states: "Apart from the physiological effects of chemical preservatives upon the human system, the addition of such substances to food is very objectionable on the ground that if a food contains sufficient chemical preservative effectually to keep it the quantity present must necessarily inhibt the process of digestion. Further, chemical preservatives often have the insidious effect of masking the process of decomposition in such a manner as to prevent taste and smell revealing the true condition of the food. For many years past the British Analytical Control has refused to countenance the addition of chemical preservatives to foods, or to extend its approval to articles which are chemically preserved. The addition of such substances is neither necessary nor desirable."

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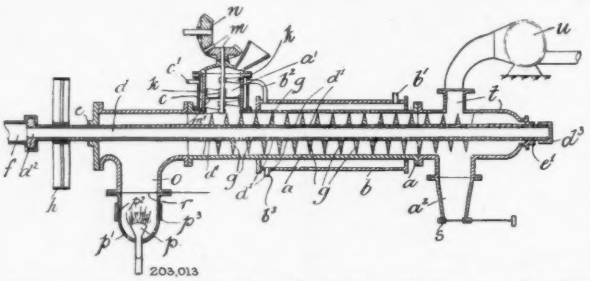
Abstracts of Complete Specifications

203,013. Drying, Grinding and Neutralising Suplhate of Ammonia in One Operation, Apparatus for. A. H. Thwaite, West Lodge, Crook, Durham, and Pease and Partners, Ltd., Darlington. Application date, April 21, 1922.

The acid salt to be treated is supplied from a hopper a^1, provided with rotary feeding blades k, to a drying cylinder a. Hot air mixed with products of combustion is supplied from a



burner p to the left-hand end of the cylinder a under the control of a damper r. The opposite end of the cylinder is connected to a suction fan u which draws off the vapour and ammonia. The cylinder a is surrounded on a part of its length by a steam jacket b connected to a jacket c surrounding the hopper a^1. The cylinder a contains a hollow shaft d carrying a screw conveyor g which is driven by a pulley h. The shaft is perforated at d^1, and an acid-neutralising gas such as ammonia, or coal gas containing it, is supplied by the stationary pipe f to the pipe d. The acid salt is thus dried, ground, and neutralised, and the product is finally delivered to a hopper a^2.

203,032. Black Azo Dyestuffs, Manufacture of. A. G. Bloxam, London. From Chemische Fabrik Griesheim-Elektron, Frankfurt-on-Main, Germany. Application date, May 29, 1922.

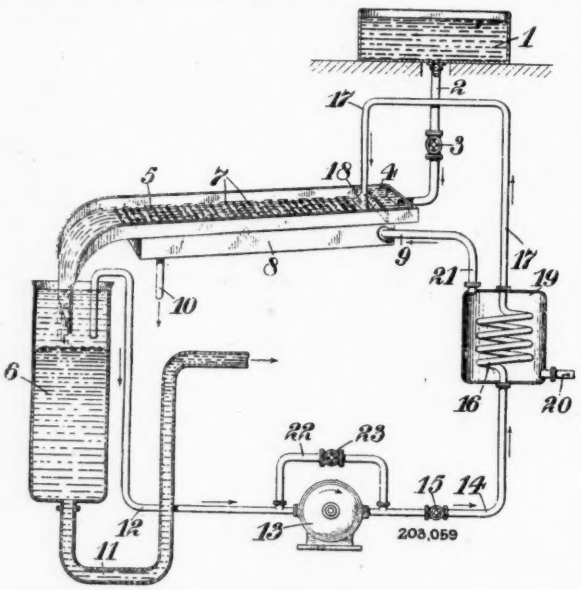
These dyestuffs are produced by combining the diazo compound of an aryl-azo-1-naphthylamine body not containing a sulphonic group with an aryl-amide of 2 : 3-oxynaphthoic acid. The dyestuffs may be produced on the fibre by impregnating with the latter substance and then treating with the former substance. As diazo components, all the amino-azo compounds which are obtained by combining diazotised aromatic amines with 1-naphthylamine or its derivatives capable of combining in a 4 position and not containing a sulphonic group may be used. The former class of compounds includes substances such as aniline, toluidines, xylidines, anisidines, phenetidines, cresidines, aminothiophenol alkyl ethers, and their negatively substituted derivatives, etc., and the latter class of compounds includes substances such as 1-amino-2-naphthol alkyl ether, 1-amino-2-methylnaphthalene, etc. As azo components all the aryl amides of 2:3-oxynaphthoic acid may be used. A number of examples of these dyestuffs are given.

203,051. 2:3-Diamino Anthraquinone. O. Y. Imray, London. From Soc. of Chemical Industry in Basle, Switzerland. Application date, May 31, 1922.

A high yield of very pure crystalline 2:3-diamino anthraquinone may be obtained by heating 2-amino-3-bromo anthraquinone with aqueous or alcoholic ammonia in a closed vessel at 170°–190° C., with or without a copper catalyst.

203,059. Reduction of Organic Compounds, Particularly Nitro- and Azo-Derivatives. D. G. Murdoch, of the Gas Light and Coke Co., Beckton, London, E.16, and W. L. Galbraith, of the Gas Light and Coke Co., Horseferry Road, Westminster, London, S.W.1. Application date, June 2, 1922.

This process is of the class in which reduction is effected by means of an amalgam of an alkali metal. In such reactions difficulties are experienced in obtaining a sufficiently intimate contact between the amalgam and the organic compound, *e.g.*, azo-anisole. The object is to provide an aqueous solvent for the organic compound, of such a nature that the alkali formed during the reaction with the amalgam may be separated and recovered. The solubility of this solvent in water should be sufficiently decreased in the presence of alkali to cause its separation as a definite layer. One class of suitable solvents is that of water soluble cyclic bases containing nitrogen within the ring; such as pyridine and piperidine. Quinoline is not suitable owing to the formation of resinous products in the presence of air. In the apparatus shown in the illustration, the vessel 1 communicates with the cathode cell of a plant in which alkali chloride is electrolysed. A mixture of *o*-nitro anisol and pyridine is supplied to the upper part of the vessel 6, and is circulated through a pipe 12, pump 13, and pipe 14 to a preheater 16, heated by a water jacket at about 65° C. The warm liquor is then employed for circulating through the chamber 8 to maintain the trough 5 at about 60° C. The preheated mixture passes through a pipe 17 to the tank 5, and thence back to the vessel 6. The mercury amalgam is supplied slowly to the trough 5, through which it passes over transverse notched ridges 7. The amalgam passes into the vessel 6, from which it passes through the pipe 11 back to the cathode cell. The liquor from the upper part of the vessel 6 is periodically removed and allowed to separate into two layers, and the pyridine removed. The



reduction product consisting of azo-anisole and anisidine is precipitated by adding water. It is found that an increase in the amount of water present in the reaction mixture favours the production of amine rather than azo and hydrazo derivatives. In the reduction of nitro compounds to the latter, a further addition of water should be made at the point at which the mixture reaches its maximum temperature. The nature of the product also varies with the temperature. The process may be accelerated by removing the alkaline liquor during the reaction and replacing it by water.

203,060. Organic Compounds, Treatment of—With Nitrous Acid. N. E. Siderfin, S. B. Tallantyre and W. V. Shannan, of the Gas Light and Coke Co., Beckton, London, E.16, and W. L. Galbraith, of the Gas Light and Coke, Co., Horseferry Road, Westminster, London. Application date, June 2, 1922.

The process is for the manufacture of nitroso derivatives of organic compounds, *e.g.*, nitroso-phenols, by treating the compound with nitrous acid. The nitrous acid may be liberated from nitrosyl sulphuric acid in sulphuric acid solution by the action of acetic or formic acid, but the latter are expensive in large scale operations, and the object of the present invention is to avoid their use. The nitrosyl sulphuric

acid solution is decomposed gradually by adding water or ice, or the nitrosyl sulphuric acid may be used by the addition of chamber crystals to a mixture of the organic compound with water or ice. The rate of decomposition of the nitrosyl sulphuric acid may be controlled by the gradual addition of water, and by the reduction of temperature to 0° C. or below. Losses through interaction of the derivative by condensation, or other by-reactions, is minimised by maintaining the concentration of the sulphuric acid as low as possible consistent with the stability of the nitrosyl sulphuric acid. The final dilution of the sulphuric acid by the addition of water or ice should be about 60° C. Examples are given of the treatment of phenol to obtain *p*-nitroso-phenol, and the further treatment of the latter by mixing with 100 per cent. sulphuric acid, cooling to 25° C., and then mixing with N-ethylcarbazole and pouring into aqueous ammonia to precipitate a N-ethylcarbazole indophenol. Another example is given of the preparation of nitroso dimethyl aniline hydrochloride.

203,098. HYDROCARBONS, PURIFICATION OF. Whitehall Petroleum Corporation, Ltd., 53, Parliament Street, Westminster, London. From A. Greenspan, Minatitlan, Vera Cruz, Mexico. Application date, June 22, 1922.

The object is to remove wax from hydrocarbons resulting from crude oil distillation when the wax is present in a combined crystalline and amorphous state. The heavy viscous oil is first treated with sulphuric acid to remove impurities, and then gradually diluted with 15–20 per cent. of kerosene distillate or unrefined paraffin oil. The crystalline wax is thus caused to crystallise, and is separated from the oil by means of a filter press. The filtrate is distilled by means of steam, which removes the amorphous wax and kerosene distillate or paraffin oil, the residue being a high grade cylinder stock of high viscosity. The amorphous wax distils off at 500°–520° F. A suitable apparatus for carrying out the process is described.

203,124. PHENOL ALDEHYDE CONDENSATION PRODUCTS, PRODUCTION OF. C. Petroff, Armianski 7, Moscow. Application date, July 7, 1922.

The condensation of phenols and formaldehyde is effected in the presence of acid reagents and acetic esters of polyhydric alcohols, *e.g.*, acetic esters of glycerine (acetins) or acetic esters of cellulose, which act as accelerators. As an example, the mixture may consist of cresol 100 parts, diacetin 50 parts, 40 per cent aqueous formaldehyde 70 parts. This is brought to boiling point, the water and acetin separated, and the resin treated with 30 parts formaldehyde. Other examples are given using phenol and triacetin with phosphoric acid as accelerator, and also a mixture of phenol and cresols with benzene sulphonic acid as accelerator.

203,158. BASE-EXCHANGING COMPOUNDS, PRODUCTION OF. T. P. Hilditch, Birchdene, Cross Lane, Grappenhall, Cheshire, H. J. Wheaton, 5, Walton New Road, Lower Walton, near Warrington, and Joseph Crosfield and Sons, Ltd., Warrington, Lancs. Application dates, August 14, 1922, and May 1, 1923.

The process is for the production of base exchanging compounds or gels particularly suitable for the purification and softening of water. These compounds have been produced: (1) by treating sodium silicate with an acid, (2) by mixing sodium silicate and sodium aluminate or other sodium compounds. It is now found that the sodium silicate may be used in conjunction with sodium chlorate, disodium phosphate, sodium sulphate, sodium nitrate, and sodium chloride. It has been found that when treating sodium silicates with these salts, gels cannot be produced with any sodium silicate solution in which the ratio of silica to soda is below 3·30 to 1. If the ratio is between 3·3:1 and 3·7:1, the solution strength must be 40°–80° Twaddell, and the other sodium salt solution must be concentrated. With higher ratios than the above, the solutions may be more dilute. The mixture is allowed to set, and the resulting gel is dried and washed.

203,218. ACTIVATING AND REACTIVATING METALLIC CATALYSTS, METHOD OF—APPLICABLE TO THE PRODUCTION OF SUCH CATALYSTS IN POWDER FORM FOR OBTAINING A CONTINUOUS HYDROGENATION. Technical Research Works, Ltd., and E. J. Lush, 4, Milner Street, London, S.W.3. Application dates, October 20, 1922, and February 9, 1923.

When a nickel catalyst is used in the hydrogenation of oils it is usually found that metal wire, turnings, plates, etc., which have received a surface treatment are not as active as finely divided nickel produced from precipitated metallic salts —*e.g.*, nickel carbonate, precipitated on kieselguhr and reduced in hydrogen. By the present invention, metallic surfaces may be given an activity equal to that of precipitated catalysts. Nickel in the form of wool, turnings, plates, etc., is packed in asbestos cloth, and made the anode in an electrolytic cell containing sodium carbonate solution of 1–5 per cent. strength. The cathode is a nickel sheet, and a current at 3–4 volts is passed through until the anode is uniformly blackened. The anode is then removed, washed, dried, and reduced in hydrogen at 250° C. for ½–1 hour, yielding the active catalyst. When used for the hydrogenation of oils, the catalyst remains active for several weeks. To produce a catalyst in powder form, either a high voltage is employed or a mixture of salts such as sodium nitrate and carbonate, one of which forms a soluble and the other an insoluble salt, is used. Hydrated nickel carbonate is formed, and is washed, dried, and reduced in hydrogen at 250° C.

203,271. MINERAL SODIUM CARBONATE, PROCESS FOR WORKING UP. R. H. D. Blattner, 120, Cromwell Road, London, S.W.7. From L. Grouchkine, 6, St. Mark's Buildings, Alexandria. Application date, February 7, 1923.

The process is for obtaining caustic soda, pure soda ash and carbon dioxide from natron or trona. The natron is divided into two parts, one of which is mixed with iron oxide and heated to 800°–900° C. in a muffle furnace, carbon dioxide being evolved. The other part is dissolved in water and the carbon dioxide passed through it to precipitate sodium bicarbonate, which is washed, dried and heated, to produce pure soda ash and carbon dioxide. The product is cooled, washed with cold water to remove sulphates and chlorides, and then bleached with boiling water to obtain concentrated soda lye, and iron oxide which is returned to the process.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—180,657 (E. O. Linton), relating to dehydrating, distilling and cracking hydrocarbon oils, see Vol. VII, p. 132; 188,656 (S. J. Vermaes and L. L. J. van Lijnden), relating to chloridising volatilisation of metals, see Vol. VIII, p. 69; 189,787 (Soc. des Produits Azotes), relating to isolation of urea, see Vol. VIII, p. 27; 192,415 (J. Michael and Co.), relating to manufacture of barium hydroxide, see Vol. VIII, p. 378.

International Specifications not yet Accepted

201,575. DYES. Farbenfabriken vorm F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, July 29, 1922.

Amino- or alkylamino-dianthraquinonyl-amine is treated with sulphonating agents such as oleum to obtain the corresponding sulphonic acids, which give grey to blue-black shades on wool. Examples are given.

201,879. TREATING ORES. Chief Consolidated Mining Co., 1, Main Street, Eureka, Utah, U.S.A. (Assignees of G. H. Wigton, 1, Main Street, Eureka, and S. M. Seddon, Salt Lake City, Utah, U.S.A.) International Convention date, August 5, 1922.

Siliceous oxidised or partly oxidised ores of lead, gold, and silver are ground and heated to a temperature between 1,700° F. and its melting point, and exposed to a current of oxidising gas. The volatilised metals are separated from the flue gas.

201,885. VULCANISING INDIARUBBER. Pirelli and Co., 21, Via Ponte, Seveso, Milan, Italy. International Convention date, August 5, 1922.

A vulcanisation accelerator consists of a substituted biguanide such as monophenylbiguanide, or their carbonates or carbamates.

201,898. INDIARUBBER, TREATING. Naugatuck Chemical Co., Elm Street, Naugatuck, Conn., U.S.A. (Assignees of E. Hopkinson, 1,790, Broadway, New York.) International Convention date, August 3, 1922.

A mixture of kieselguhr 100 parts, water 150 parts, ammonia 9 parts and rubber latex containing 36 per cent. solids, 100 parts, is pressed to remove excess water, and then ground and dried. The dry material is treated with chlorine until the

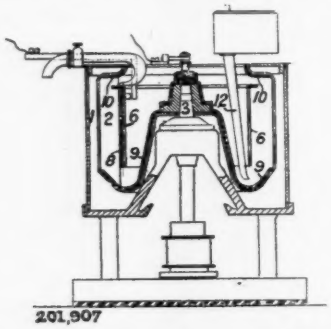
weight increases 20–24 per cent., and then again ground and treated with chlorine. Ammonia is added to neutralise acid, and the product moulded under pressure. The properties of the rubber are thereby modified, and products are obtained which may be calendered, or which are porous or hard.

201,906. CONDENSATION PRODUCTS FROM FORMALDEHYDE AND UREA, THIOUREA, ETC. F. Pollak, 20, Langegasse, Vienna. (Assignee of K. Ripper, 6, Bleichergasse, Vienna.) International Convention date, August 2, 1922.

In the manufacture of condensation products from formaldehyde and urea or thiourea, the fluid intermediate product is treated with strong or weak bases, or basic salts to reduce or eliminate acidity, the amount of added base being more than sufficient to fix any free formaldehyde. The hardened material is maintained clear by the addition prior to hardening of sodium or calcium chloride, sodium salicylate, or potassium iodide. The condensing agent used may be hexamethylene-tetramine.

201,907. CENTRIFUGAL SEPARATORS. A. Marx, 162, Boulevard Voltaire, Paris. International Convention date, August 3, 1922.

Suspensions or emulsions, *e.g.*, of sulphur or oil, are rapidly separated by combined centrifugal and electric action. The bowl 1 is carried by a rotating shaft 3, and is provided with



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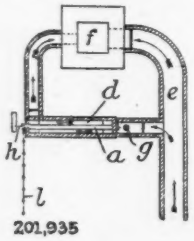
radial vanes 2. The surfaces are covered as shown by insulation 8, 9, 10. The suspension is supplied by a pipe 12, and fills the space between the outer wall of the bowl 1, and the fixed cylinder 6. A difference of potential is maintained between the members 1, 6, and the suspended particles are deposited on the bowl or cylinder.

201,935. DISTILLING GAS LIQUOR, ETC. A. Cabrier, 2, Via Pisana, Florence, Italy. International Convention date, August 5, 1922.

Ammoniacal liquor, tar, oils, etc., are distilled by passing them through a long tubular retort *a*, placed in a by-pass *d*



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between the furnace flue of the gas producers, *e*, and the stack *f*. The retort may be formed of two U-bars welded together, and the liquor passes through from *g* to *h*. Vapour is condensed in an undulating pipe *l*.

201,918. TREATING ZINC ORES. Electrolytic Zinc Co., of Australasia, Ltd., 360, Collins Street, Melbourne, Australia. (Assignees of H. W. Gepp, H. Hey and G. Rigg, 360, Collins Street, Melbourne, and R. H. Stevens and R. T. D. Williams, Risdon, Hobart, Tasmania.) International Convention date, August 1, 1922.

Zinc ore containing insoluble zinc compounds is dried and mixed in a rotary mixer with suphuric acid to convert the zinc into sulphate, sufficient excess of acid being present to form nodules. The mixture is dried and subjected to the action of gases containing sulphur dioxide in a shaft furnace at 620°–740° C. The gases may subsequently be scrubbed and converted into sulphuric acid.

201,912. VULCANISING INDIARUBBER. Pirelli and Co., 21, Via Ponte, Seveso, Milan, Italy. International convention date, August 5, 1922.

Trisubstituted thio-ureas, prepared by condensing an aryl sulphocyanide with a secondary aliphatic or alicyclic base are used as vulcanisation accelerators. Monoaryl-dialhyl derivatives such as phenyldimethyl-thiourea, and monoaryl-alkylene derivatives such as phenyl-pentamethylene-thiourea are preferred.

LATEST NOTIFICATIONS.

204,302. Concentration of ores. Emery, A. B. September 21, 1922.

204,322. Working up copper cellulose sludge. Vereinigte Glanzstoff-Fabriken Akt.-Ges. September 20, 1922.

204,335. Apparatus for extracting oil from shale or the like. S. E. Co. September 20, 1922.

204,337. Process of Producing substances from boron and carbon. Hartstoff-Metall Akt.-Ges. (Hametag). September 20, 1922.

Specifications Accepted, with Date of Application

177,174. Chromates, Manufacture of. A. J. B. Jouve, A. Helbronner, and Soc. Hydroelectrique and Metallurgique du Palais. March 17, 1921.

181,391. Alkyl celluloses, Dyeing of. L. Lilienfeld. June 13, 1921.

181,392–5. Cellulose ethers and derivatives, Manufacture of. L. Lilienfeld. June 13, 1921.

183,816. Tungsten powder, Manufacture of. Naamlooze Vennootschap Philip's Gloeilampenfabrieken. July 29, 1921.

185,729. Artificial manures, Manufacture of. J. Gradl. September 3, 1921. Addition to 184,800.

187,603. Acetic acid from pyroligneous acid, Method and apparatus for recovering and concentrating. T. J. Brewster. October 19, 1921.

189,789. Gas, Method of producing. F. G. Liljenroth. December 3, 1921.

193,012. Sintering fine ores and the like, Method of. Allmänna Ingeniörsbyran. H. G. Torulf. February 8, 1922.

194,730. Filters. L. B. Fiechter. March 13, 1922.

201,123. Evaporating, distilling, concentrating, or like apparatus. Soc. des Condenseurs Delas. July 21, 1922.

203,720. Colloidal dispersions, Production of. J. F. Moseley. March 8, 1922.

203,722. Metallurgical gases containing sulphur dioxide, Treatment of. A. E. White. (*American Smelting and Refining Co.*) March 10, 1922.

203,743. Distillation or evaporation of liquids. J. L. Major. May 13, 1922.

203,749. Alkali silicates. W. Clayton and H. W. Richards. May 18, 1922.

203,798. Alumina from sulphate of aluminium, Method of manufacture of. A. Hurter. June 15, 1922.

203,812. Formic acid derivatives, Process for producing. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) June 20, 1922.

203,820. Aryl esters of phosphoric acid, Manufacture of. A. G. Bloxam. (*Chemische Fabrik Griesheim Elektron.*) June 27, 1922.

203,824. Aryloxynaphthyl-ketones, Manufacture of. O. Y. Imray. (*Soc. of Chemical Industry in Basle.*) June 30, 1922.

203,963. Cement from blast furnace slag, Making of. W. R. Cochrane. November 23, 1922.

Applications for Patents

Badische Anilin and Soda-Fabrik and Johnson, J. Y. Production of dyeings on fibre. 24,121. September 27.

Crosfield and Sons, Ltd., J., Hilditch, T. P., and Wheaton, H. J. Means for purifying or softening water, etc. 23,838. September 24.

Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of arseno-benzene derivatives. 24,306. September 29. (Germany, September 29, 1922.)

Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of diaminodiaryldialkylmethanes. 24,307. September 29. (Germany, September 29, 1922.)

Ganahl, C. F. de. Process for cracking oils. 24,217. September 28.

Girouard, Sir E. P. C. Manufacture of cement. 24,222. September 28.

Metallbank-und Metallurgische Ges. Sulphur furnace. 24,023. September 26. (Germany, January 31.)

Norsk Hydro-Elektrisk Kvælstofaktieselskab. Synthetic production of ammonia. 23,950. September 25. (Norway, October 12, 1922.)

Quain, J. R. Sterilising organic substances. 23,921. September 25.

Williams, J. G. Manufacture of acid phosphate salts soluble in water. 24,166. September 28.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, October 4, 1923.

TRADE generally during the past week has been quietly steady, and there are indications of a slight broadening in the demand. Prices generally are without change. There is nothing of special interest in the export market to report.

General Chemicals

ACETONE maintains its firm position, and continues extremely scarce on the spot.

ACID ACETIC is firm and in fairly brisk demand.

ACID CITRIC in very poor demand and inclined to be easy.

ACID LACTIC is very firm and rather scarce on the spot.

ACID OXALIC.—Only in moderate request, and price without change.

ACID TARTARIC.—Only in poor demand and price easy.

BARIUM CHLORIDE has been a fairly bright spot, and the price is firm.

CREAM OF TARTAR is unchanged.

FORMALDEHYDE has been in moderate request, and the price is now steady.

LEAD ACETATE is very firm and in moderately active demand.

LEAD NITRATE.—Unchanged.

POTASSIUM CARBONATE.—The price seems a little firmer, although the demand is small.

POTASSIUM PERMANGANATE is fairly active, without change in value.

POTASSIUM PRUSSIATE.—Price unchanged, but business can be described as being a little better.

SODIUM ACETATE is firm, but the demand is only moderate.

SODIUM HYPOSULPHITE.—Fairly active at English makers' figures.

SODIUM PRUSSIATE.—There have been a few inquiries on export account, but, speaking generally, actual business is extremely quiet.

SODIUM SULPHIDE.—Unchanged.

ZINC SALTS are fairly active, without change in value.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID is in better demand, and higher prices are expected.

BROMIDES.—Fair quantities are held in second hands below the prices of continental makers.

COCAINE is in active demand at the recently advanced prices.

EUCALYPTUS OIL is in demand, and prices are likely to advance.

GUAIACOL CARBONATE is firm, and in demand at higher prices.

HEXAMINE shows a firm tendency and is in good demand.

METHYL SALICYLATE is in good demand at the recently advanced price.

PHENAZONE is in good demand, and high prices are ruling.

SODA SALICYLATE.—The leading continental makers have advanced their prices, and there is good demand for both powder and crystal.

Coal Tar Intermediates

Home buyers have been a little more in evidence lately in this country, while export inquiries continue to be freely received, although in a number of cases there does not appear to be much firm business done.

ALPHA NAPHTHOL continues in strong demand, and the price is firm.

ALPHA NAPHTHYLAMINE.—Some small home orders have been received, but there is nothing of signal interest to report.

ANILINE OIL AND SALT are steady and in demand for spot delivery.

BENZIDINE BASE.—Some small orders have been booked.

BETA NAPHTHOL.—A few home inquiries are reported.

DIETHYLANILINE.—Some home orders have been booked.

DIMETHYLANILINE is steady.

DIPHENYLAMINE is very firm with a fair demand.

"G" SALT.—Some orders are reported.

NAPHTHIONATE OF SODA continues in demand with the price firm.

NITRO BENZOL.—Good export inquiries have been received.

METHAPHENYLENEDIAMINE has been a small home trade at recent values.

PARANITRANILINE is without special feature.

Coal Tar Products

The tone of the market generally is steady.

90% BENZOL has a rather better demand, although prices remain somewhat low. Its value to-day is from 1s. 3d. to 1s. 4d. per gallon on rails.

PURE BENZOL is also slightly better, and is worth 1s. 7d. to 1s. 8d. per gallon on rails.

CREOSOTE OIL is steady, at 8¼d. to 8½d. per gallon on rails in the North, and 9¼d. to 9½d. per gallon in the South.

CRESYLIC ACID remains unchanged, the pale quality, 97/99%, being worth 1s. 10d. to 2s. per gallon on rails, while the dark quality, 95/97%, is quoted at 1s. 7d. to 1s. 8d. per gallon on rails.

SOLVENT NAPHTHA.—There has been a little business done in this article during the past week, but prices remain at a very low level, and supplies are still plentiful. Its value is not more than 1s. per gallon on rails, but a further drop in price is not looked for, and the chances are that a slight improvement may take place during the next few weeks, although it is feared that this will be only temporary.

HEAVY NAPHTHA is without inquiry, and is nominally worth about 1s. 2d. per gallon on rails.

NAPHTHALENE has a somewhat irregular market, due to abnormal conditions prevailing. The demand for low grade quality has beenf airly good, and it is worth about £6 10s. per ton on rails. 74/76 quality is plentiful, and is worth £7 10s. to £8 per ton on rails, while the 76/78 quality is worth from £8 10s. to £9 10s. per ton.

PITCH.—The demand is fairly good, but owing to the divergence between buyers' and sellers' ideas of prices, few transactions have been reported. To-day's values are:—125s. to 130s. per ton, f.o.b., London; 122s. 6d. to 127s. 6d. per ton, f.o.b., East Coast port; 120s. to 125s. per ton, f.o.b., West Coast port.

Sulphate of Ammonia

The export demand is fairly satisfactory, but prices are somewhat easier. To-day's value is:—£14 10s. to £15 per ton, f.o.b., U.K., port, double bags.

[Current Market Prices on following pages.]

Higher Sulphate of Ammonia Prices

THE British Sulphate of Ammonia Federation announce that their prices for October and November are being raised by 2s. 6d. per ton per month. For home agricultural use they offer sulphate of ammonia at the following prices:—

October delivery, 1923.—£14 12s. 6d. per ton for neutral quality in fine friable condition, free from lumps; basis, 25¾ per cent. ammonia.

November delivery, 1923.—£14 15s. per ton for neutral quality, as above.

Delivery is at the consumer's nearest station or wharf in Great Britain, for prompt cash payments, in lots of four tons and upwards. Limited quantities of ordinary quality will be available in some districts, and will be sold at 23s. per ton less than the above prices; basis, 25¼ per cent. ammonia.

It is explained that the unit value of nitrogen in the prices for neutral quality is about 14s., and corresponds to a price of about £10 18s. per ton for nitrate of soda. When the price of nitrate is £12 per ton at British ports, sulphate of ammonia is worth well over £17 per ton delivered. The production of neutral sulphate has increased, and the Federation expect that the bulk of the deliveries will henceforward be of neutral quality. They, however, reserve the option of delivering ordinary quality in some districts. It is the Federation's intention to work to a schedule of increasing prices during the remainder of the season.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	127	10	0	to	130	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	49	0	0	to	50	0	0
Acetic, 40% pure	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	1	1½	to	0	1	2½
Citric	lb.	0	1	5	to	0	1	5½
Formic, 80%	ton	50	0	0	to	51	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol	ton	39	0	0	to	40	0	0
Lactic, 60 vol	ton	44	0	0	to	46	0	0
Nitric, 80 Tw	ton	26	0	0	to	27	0	0
Oxalic	lb.	0	0	6½	to	0	0	6½
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	1½	to	0	1	2
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	35	0	0	to	37	10	0
Nitrate (pure)	ton	35	0	0	to	40	0	0
Phosphate	ton	65	0	0	to	68	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	65	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	15	10	0	to	16	0	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	7	6	to	10	17	6
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	100	0	0	to	105	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	10	0	to	26	0	0
Cream Tartar, 98–100%	ton	86	0	0	to	88	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol	ton	73	0	0	to	74	0	0
Formusol (Rongalite)	lb	0	2	1	to	0	2	2
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols	gal	0	2	0	to	0	2	1
Iron perchloride	ton	18	0	0	to	20	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	41	0	0	to	42	0	0
Carbonate (White Lead)	ton	43	0	0	to	45	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	10	0	to	3	15	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	8	0	0	to	9	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	50	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	30	0	0	to	32	0	0
Potassium bichromate	lb.	0	0	5½	to	0	0	6
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	65	0	0	to	70	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	2	10	to	0	3	0
Prussiate, yellow	lb.	0	1	0	to	0	1	1
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4½
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3	to	0	0	3½
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	27	10	0	to	28	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	6	to	0	0	6½
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62 %	ton	14	10	0	to	15	10	0
Sulphite, cryst	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	0	11½	to	0	1	0
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	0	to	0	3	3
Acetanilid	lb.	0	1	6	to	0	1	9
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	6	to	0	2	9
Salicylic, B.P.	lb.	0	2	1	to	0	2	3
Tannic, leviss	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	9	to	0	8	3
Amidopyrin	lb.	0	12	0	to	0	12	6
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	17	6	to	0	18	6
Beta naphthol resublimed	lb.	0	1	9	to	0	2	0
Bromide of ammonia	lb.	0	0	7	to	0	0	7½
Potash	lb.	0	0	6	to	0	0	6½
Soda	lb.	0	0	7	to	0	0	7½
Caffeine, pure	lb.	0	10	9	to	0	11	0
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	1	9	to	0	2	0
Calomel	lb.	0	3	9	to	0	4	0
Chloral hydrate	lb.	0	4	0	to	0	4	3
Cocaine alkaloid	oz.	0	19	6	to	1	0	0
Hydrochloride	oz.	0	16	9	to	0	17	3
Corrosive sublimate	lb.	0	3	3	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	8	to	0	2	10
B.P. (75–80% eucalyptol)	lb.	0	2	9	to	0	2	11
Guaiacol carbonate	lb.	0	9	0	to	0	9	6
Liquid	lb.	0	8	9	to	0	9	3
Pure crystals	lb.	0	9	3	to	0	9	9
Hexamine	lb.	0	3	8	to	0	3	10
Hydroquinone	lb.	0	3	6	to	0	4	0
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	17	6	to	0	19	0
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	8	to	0	3	2
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	2	6	to	4	5	0
Paraldehyde	lb.	0	1	5	to	0	1	6
Phenacetin	lb.	0	6	0	to	0	6	3
Phenazone	lb.	0	8	0	to	0	8	6
Phenolphthalein	lb.	0	6	9	to	0	7	0
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	6	to	0	5	9
Salicylate of soda powder	lb.	0	2	6	to	0	2	9
Crystals	lb.	0	2	9	to	0	3	0
Salol	lb.	0	3	0	to	0	3	3
Soda Benzoate	lb.	0	2	4	to	0	2	6
Sulphonal	lb.	0	14	0	to	0	14	6
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	11	0	to	0	11	6
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	3	0	to	1	4	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9	to	0	0	9½
Salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	6	to	0	2	9
Benzidine, base	lb.	0	4	9	to	0	5	0
Sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Crocein Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	6	to	0	3	9
H-Acid	lb.	0	4	9	to	0	5	0
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	6	to	0	2	8
Naphthionate of Soda	lb.	0	2	6	to	0	2	8
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nevill Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils,	£	s.	d.
Anise c.i.f. 1/8½ spot	0	1	9
Bay	0	12	0
Bergamot firm	0	13	0
Cajaput easier	0	3	3
Camphor, white per cwt.	4	0	0
Brown "	3	15	0
Cassia easier, c.i.f. 10/6 spot	0	11	0
Cedarwood	0	1	4½
Citronella (Ceylon), nominal, very firm and scarce c.i.f. 3/6 spot	0	4	0
(Java) very firm, c.i.f. 4/0 spot	0	4	2
Clove	0	7	6
Eucalyptus firm	0	2	6
Geranium Bourbon firm	1	10	0
Lavender firm	1	2	0
Lavender spike firm	0	2	9
Lemon	0	3	11
Lemongrass per oz.	0	0	2½
Lime (distilled)	0	4	0
Orange sweet (Sicilian)	0	11	0
(West Indian)	0	9	0
Palmarosa	1	3	0
Peppermint (American)	0	15	0
Mint (dementholised Japanese)	0	12	0
Patchouli	1	10	0
Otto of Rose per oz.	1	15	0
Rosemary	0	1	7
Sandalwood	1	6	0
Sassafras firm	0	6	6
Thyme 2/6 to	0	8	0
Synthetics.			
Benzyl acetate	0	3	0
Benzoate	0	3	0
Citral	0	10	0
Coumarine	0	18	6
Heliotropine	0	8	0
Ionone	1	5	0
Linalyl acetate	1	2	6
Methyl salicylate firm	0	2	6
Musk xylol	0	11	0
Terpeniol	0	3	0

The Metallurgy of Zinc

THE publication of a Bulletin (208), *The Electrothermic Metallurgy of Zinc*, by Mr. B. M. O'Harra, associate metallurgist, is announced by the United States Department of the Interior, through the Bureau of Mines. Zinc smelting is frequently termed a backward art, states the author of the bulletin. The term is hardly true, for great progress has been made in recent years in the design and in the thermal efficiency of the retort furnace, in the quality of retorts, in the recovery of zinc, and in the ability to treat more impure and complex ores. The fact remains, however, that the peculiar physical and chemical properties of zinc have delayed such immense advances—large smelting units, high recovery, low unit costs, and ability to treat low grade ores—as have been made in the metallurgy of lead and copper. Much work has been done in an effort to find cheaper and more efficient methods of recovering zinc from its ores. Various methods have been proposed for smelting in the blast furnace. Some of these contemplated the production of zinc vapour and its condensation to liquid; others attempted to produce liquid zinc directly by smelting under pressure. It is now realised that fundamental difficulties render these proposals impracticable.

The electric furnace for smelting offers obvious advantages in the way of the efficient utilisation of energy, large units, easy attainment of high temperatures and the possibility of treating complex ores. Messrs. E. H. and A. H. Cowles first suggested a design for an electric furnace for the reduction of zinc ores in 1885. In 1900 several investigators started work upon various processes and had more or less success. The chief difficulty they encountered was the impossibility of obtaining more than a small amount of the zinc as liquid metal because most of the zinc vapour condensed as blue powder. Interest in the electrothermic metallurgy of zinc increased until, in 1914 and 1915, the problem seemed to be approaching solution. About this time the hydrometallurgy of zinc sprang into the limelight and a commercial process was soon perfected. This rapid development, perhaps aided by the war premium on the high grade spelter produced by electrolytic deposition, distracted attention from electric smelting to some extent, though progress continued. With the perfection and standardisation of the electrolytic process has come a better realisation of its limitations, especially the necessity for large-scale operation and the difficulty of obtaining high extraction. Because of these limitations the electrothermic metallurgy of zinc still has a field of its own and, in fact, promises to become a strong competitor of both hydrometallurgy and retort smelting except under conditions highly favourable to the latter methods. Because of the imperfections of the retort and electrolytic processes and the promise that the electric furnace offers in overcoming these imperfections, the United States Bureau of Mines, in co-operation with the Missouri School of Mines and Metallurgy, has undertaken a study of the electrothermic metallurgy of zinc.

Copies of Bulletin 208 may be obtained from the Department of the Interior, Bureau of Mines, Washington, D.C.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, October 4, 1923.

THERE has been a little more inquiry for heavy chemicals during the past week, but in most cases quantities stated are small.

Prices on the whole, both for Continental and Home material, are steady.

Industrial Chemicals

ACID ACETIC, GLACIAL.—98/100%, £60 to £65 per ton, in casks; 80% pure, £51 to £53 per ton; 80% technical, £47 to £48 per ton, c.i.f. U.K. ports, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC (ICE CRYSTALS).—Moderate inquiry. Price unchanged at about 1s. 2d. per lb.

ACID CITRIC.—In little demand. Now offered at about 1s. 5½d. per lb., less 5%.

ACID FORMIC.—Now offered at about £49 per ton, ex store, spot delivery.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80%.—About £23 10s. per ton—ex station, full truck loads.

ACID OXALIC.—Unchanged at about 6d. per lb., ex store.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC.—B.P. crystals. Very little inquiry. Spot material offered at about 1s. 1d. per lb., less 5%, ex store. Quoted at 1s. 0½d. per lb., less 5%, c.i.f. U.K. ports, early delivery.

ALUMINA, SULPHATE.—Quoted 14/15%, £8 10s. per ton; 17/18%, £7 10s. per ton, c.i.f. U.K. ports.

ALUM, CHROME.—Price about £24 per ton, ex store, spot delivery.

ALUM, POTASH (Lump).—Spot lots on offer at £10 10s. per ton, ex store.

AMMONIA, ANHYDROUS.—Quoted 1s. 5½d. per lb., ex station. Offered for export at about 1s. 4½d. per lb., f.o.b. U.K. ports.

AMMONIA CARBONATE.—Lump, 4d. per lb.; ground, 4¼d. per lb., delivered.

AMMONIA LIQUID 880°.—Offered at 3¼d. per lb., ex station, containers extra.

AMMONIA MURIATE.—Grey galvanisers quality. Unchanged at £31 to £32 per ton. Fine white crystals offered at £23 15s. per ton, c.i.f. U.K. ports.

AMMONIA NITRATE.—Quoted £35 10s. per ton, c.i.f. U.K. ports.

AMMONIA SULPHATE.—25¼%, £12 17s. per ton; 25¾%, neutral quality, £14 per ton, ex works.

ARSENIC, WHITE POWDERED.—Moderate inquiry. Spot lots about £69 to £70 per ton, ex store.

BARIUM CARBONATE 98/100%.—Price about £14 per ton ex wharf, early delivery.

BARIUM CHLORIDE 98/100%.—Spot lots on offer at about £14 per ton, ex store.

BARYTES.—Finest white English, £5 5s. per ton, ex works.

BLEACHING POWDER.—Spot lots, £11 5s. per ton, ex station. Contracts 20s. per ton less.

BORAX, GRANULATED.—£24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations. Minimum ton lots.

CALCIUM CHLORIDE.—English material, £5 12s. 6d. per ton, ex station. Offered for export at about £4 10s. per ton, f.o.b. U.K. port.

COPPERAS, GREEN.—Quoted £2 5s. per ton, f.o.b. U.K. port, in bulk.

COPPER SULPHATE.—Moderate export inquiry. Price about £25 10s. per ton, less 5% f.o.b. U.K. ports.

FORMALDEHYDE 40%.—Quoted £63 per ton, ex wharf, early delivery.

GLAUBER SALTS.—Fine white crystals, price about £3 15s to £3 17s. 6d. per ton, ex store.

LEAD, RED.—English material, £40 per ton, carriage paid U.K. stations. Continental about £36 per ton, ex store. Spot delivery.

LEAD, WHITE.—Continental material on offer at about £41 per ton, ex wharf.

LEAD ACETATE.—White crystals, now quoted at £41 10s. per ton, ex wharf. Offered from Continent at £38 15s. per ton, c.i.f. U.K. ports.

MAGNESITE, GROUND CALCINED.—English material unchanged at about £8 to £8 5s. per ton, ex station. Finest Continental about £7 10s. per ton, c.i.f. U.K. ports.

MAGNESIUM CHLORIDE.—Continental prices unchanged at about £2 10s. per ton, c.i.f. U.K. ports. Spot lots about £3 5s. per ton, ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—B.P. quality packed in bags offered at £6 5s. per ton, ex station.

POTASH CAUSTIC 88/92%.—Spot material about £32 to £33 per ton, ex store. Offered for early delivery at £30 per ton, ex wharf.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb. delivered.

POTASSIUM CARBONATE 96/98%.—Spot material now quoted £29 5s. per ton, ex store. Offered from Continent at about £27 per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE.—Unchanged at about 3d. per lb.

POTASSIUM PERMANGANATE.—B.P. crystals quoted 10d. per lb., ex store, spot delivery. Lower prices for forward delivery.

POTASSIUM PRUSSIATE (YELLOW).—Rather better inquiry. Now quoted 1s. 1d. per lb., ex store, spot delivery. Moderate export inquiry.

SODA, CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Unchanged at about £25 per ton, ex store, spot delivery. Offered from Continent at £23 15s. per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, makers advise reduction in price of 2s. 6d. per ton as from October 1. Now £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Offered from the Continent at about £8 17s. 6d. per ton, c.i.f. U.K. ports. Spot lots quoted £10 per ton, ex store. Pea crystals about £14 5s. per ton, ex store, spot delivery.

SODIUM NITRATE.—Refined 96/98% unchanged at about £13 7s. 6d. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE 100%.—About £26 to £28 10s. per ton, according to quantity. Moderate export inquiry.

SODIUM PRUSSIATE (YELLOW).—Unchanged at about 6d. per lb., ex store, but could probably be obtained at a fraction less.

SODIUM SULPHATE (SALTCAKE).—£4 per ton, ex station, for home consumption. Moderate export inquiry and higher prices obtained.

SODIUM SULPHIDE.—English material now offered at £14 per ton, ex station for solid 60/65% quality. Broken, £1 per ton extra; 31/34% crystals quoted £8 15s. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN, CRYSTALS.—Unchanged at 1s 4d. per lb.

TIN, SULPHATE.—Continental material now quoted about £13 10s. per ton, c.i.f. U.K. ports. Spot lots about £14 5s. per ton, ex store.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ANILINE OIL.—Good export demand. Market firm at about 10½d. per lb., drums included, f.o.b.

ANTHRA QUINONE.—Small home inquiry. Price quoted 2s. 4d. per lb., delivered.

BENZIDINE BASE.—Some export inquiries. Price 5s. per lb., 100% basis, f.o.b.

CLEVES ACID.—Limited home demand. Price 3s. 7d. per lb., 100% basis.

DIMETHYLANILINE.—Export inquiries. Price quoted 2s. 8d. per lb., drums included, f.o.b.

DINITROCHLORBENZOL.—Export inquiry. Price quoted £90 per ton, f.o.b.

DIETHYLANILINE.—Home inquiry. Price 5s. 2d. per lb., delivered.

ETHYL BENZYL ANILINE.—Small home inquiry. Price 7s. per lb., returnable packages.

NAPHTHIONATE OF SODA.—Small home inquiry. Price 3s. per lb., 100% basis, delivered.

ORTHO TOLUIDINE.—Export inquiry. Price quoted 11d. per lb., f.o.b.

PARANITRANILINE.—Home inquiry. Price 2s. 7d. per lb., delivered.

S.S. ACID.—Export inquiry. Price 15s. per lb., 100% basis, f.o.b.

Technical Chemical Series of Text Books

AMONG the autumn announcements by Ernest Benn, Ltd., are three important volumes in their "Technical Chemical Series," the first volume of which, *The Causes and Prevention of Corrosion*, by A. A. Pollitt, M.Sc., was published last June. The first of the new volumes will be that on *The Chemistry of Paints, Pigments and Varnishes*, by J. G. Bearn, M.Sc., A.I.C., and it will be followed very closely by volumes on *The Chemistry of Rubber*, by B. D. Wilkinson Luff, F.I.C., and *The Chemistry and Physics of Clays and other Ceramic Materials*, by A. B. Searle.

Of interest to petroleum technologists will be a short monograph by Dr. P. E. Spielmann, Ph.D., F.I.C., which the same firm are publishing this week under the title of *The Genesis of Petroleum*. This is a subject which has called forth a great deal of research work of a high order, much of which has been published from time to time in scientific journals all over the world, but it is only in the last few years that the problem of the genesis of petroleum has come at all near to solution and, strangely enough, the results of these later researches have never before been collected and brought together in a convenient compass. Dr. Spielmann has aimed at presenting all the available information on an abstruse subject in a form adapted to the practical needs of all who are connected with the petroleum industry, whether in a technical capacity or otherwise.

Reduced Nitrate Stocks

THE nitrate statistics issued by Aikman (London), Ltd., put the total supply of nitrate stocks in sight at September 30 at 1,446,000 tons, against 1,945,000 a year ago, 2,469,900 two years ago, and 1,414,000 in 1913.

A message from the Valparaiso branch of the Anglo-South American Bank, Ltd., dated September 27, states: "During the past week sales of nitrate have again been on a satisfactory scale, the amount disposed of for delivery in the nitrate year 1923-1924 totalling 724,916 metric quintals, as compared with 820,420 metric quintals in the previous week. The amount of the fertiliser sold for delivery during the period mentioned now totals 12,367,715 metric quintals, the various delivery dates being as follows: July, 1,500,000 metric quintals; August, 1,750,000; September, 1,750,000; October, 2,000,000; November, 1,962,100; December, 2,245,123; January, 540,224; February, 594,868; March, 25,400."

Trade Agreement with Czecho-Slovakia

THE Board of Trade has been notified by the Foreign Office that the trade agreement with Czecho-Slovakia regarding travellers' samples concluded last January. It was ratified at Prague on September 7.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, October 4, 1923.

BUSINESS on the chemical market here is about maintained at the slightly improved level of the past week or two and values also, on the whole, have kept up. An important reduction is a cut of half-a-crown a ton in the price of 58 per cent. alkali. The domestic demand for chemicals generally may be regarded as satisfactory considering the general industrial situation. Foreign business is rather more active, with transactions chiefly on colonial account.

Heavy Chemicals

Saltcake is in quietly steady demand both for home consumption and for shipment at £4 10s. per ton. Caustic soda is steady at £16 17s. 6d. per ton for 60 per cent. and up to £19 7s. 6d. for 76–77 per cent. material; a fair amount of business is being put through for both branches of trade. Prussiate of soda keeps quiet at round 6d. per lb. Hyposulphite of soda still fails to attract much attention, though prices are unchanged from last week at £14 to £14 10s. per ton for photographic crystals and £9 10s. for commercial. Bleaching powder is being steadily taken up by home users and also for export, with home trade prices firm at £11 5s. per ton. Glauber salts are quiet, but steady at £4 per ton. Bicarbonate of soda is firm and in moderate demand at £10 10s. per ton delivered. Home and foreign buying of alkali is maintained; makers this week have reduced the price of the former to £7 10s. per ton for 58 per cent. material. Soda crystals are only a moderately active section at £5 5s. per ton delivered. Sulphide of soda is still inactive, though prices are maintained at £14 10s. per ton for 60–65 per cent. concentrated solid and £9 per ton for crystals. Acetate of soda is in short supply at £24 per ton, but demand is only moderate. Chlorate of soda is firm and in good inquiry at 2¾d. per lb. Nitrite of soda keeps up at last week's level of £26 10s. per ton; offers, however, are still rather short for early delivery. Bichromate of soda meets with a steady inquiry at 4½d. per lb. Phosphate of soda is quiet at £15 per ton.

Caustic potash is firmly held at round £30 per ton for 88–90 per cent. material, an active demand being met with. Carbonate of potash is in much the same position, with 90 per cent. quality quoted at £28 and 96 per cent. at £30 per ton. Yellow prussiate of potash is quiet with quotations still ranging between 1s. and 1s. 1d. per lb. Permanganate of potash is steady at 9d. to 9½d. per lb., the demand, however, continuing on a restricted scale. Chlorate of potash is in rather good inquiry at 2¾d. to 3d. per lb. Bichromate of potash meets with a ready sale at 5¾d. per lb.

The demand for arsenic is less urgent and prices are on the easy side at £67 to £68 per ton for white powdered, Cornish makes; lower prices are still being asked for foreign brands. Commercial Epsom salts meet with a steady demand and prices are firm at £4 10s. to £4 15s. per ton, with magnesium sulphate, B.P., quoted at £6 10s. Sulphate of copper is still rather neglected at about £26 per ton f.o.b. Nitrate of lead is quiet but steady at £42 per ton. White sugar of lead is scarce at £41 and brown at £42 to £43 per ton. Acetate of lime is very firm at £22 for grey and £12 10s. per ton for brown.

Acids and Tar Products

The position of the acids is much the same as last week. Tartaric and citric are both inactive, the prices are steady at 1s. 2d. and 1s. 6d. per lb. respectively. Oxalic acid is also quiet at 5¾d. to 6d. per lb. Acetic acid is firm and in steady demand at £47 for 80 per cent. technical and £65 per ton for glacial.

Inquiries for pitch are still coming in, though the actual business is small; quotations are more or less nominal at £6 to £6 10s. per ton, Manchester. Creosote oil is steady and in moderate demand at 8½d. per gallon. Solvent naphtha meets with a fair inquiry at 1s. 3½d. per gallon. Carbolic acid is still scarce and firm at 3s. 6d. to 3s. 8d. per gallon for crude and 1s. 2½d. per lb. for crystals. Naphthalenes are rather quiet, with refined on offer at £19 to £20 and crude at £6 to £12 per ton, according to grade.

Company News

MAYPOLE CO. (1899), LTD.—The accounts for the year 1922 show a debit balance brought in of £5,001, to which is added first mortgage debenture interest £609, and loss on trading for the year £795, making a total debit balance of £6,405 to be carried forward.

BOOTS' PURE DRUG CO., LTD.—The directors have declared an interim dividend of 9 per cent. (less tax) on the new ordinary shares with respect to the quarter ended September 30. Dividend warrants will be posted on November 1 to shareholders registered on the books of the company on October 15.

BELL'S UNITED ASBESTOS CO., LTD.—The Directors have declared an interim dividend on the ordinary shares of 6d. per share, less income tax, on account of the profits of the current year. The dividend will be paid on October 22 to shareholders on the register on October 6, and the ordinary share transfer books will be closed from October 6 to 19, both dates inclusive.

Tariff Changes

UNITED STATES OF AMERICA.—The following modifications have been recently laid down regarding imports: Cresol, although containing less than 5 per cent. of tar acid distilling below 190° C., is dutiable under paragraph 27 of the Tariff Act of 1922 if yielding 75 per cent. or more of tar acid when distilling below 215° C. Asbestos, asphalt and other composition shingles are dutiable according to the component material of chief value.

FINLAND.—The Board of Trade have now received a copy (in Finnish) of the proposed new Finnish Customs Tariff. Persons interested may consult the Tariff at the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.

GERMANY.—As from September 27, goods not included in the list annexed are exempted from the requirement of an export licence on exportation from Germany: Coal—potash—salt.

JAPAN.—By an Imperial Ordinance of September 17, articles in the following list are exempt from import duty until March 31 next: Mineral oils, other than crude, including lubricating oils which contain animal and vegetable oils or fats, soap, etc., the specific gravity of which does not exceed 0·370 at 15° C.; boric acid, tartaric acid, bicarbonate of soda and salicylate of soda; peroxide of hydrogen, alum, chloroform, iodoform, milk sugar, antipyrin, santonin, carbonate of creosote, carbonate of guaiacol, pepsin, and certain compounds of drugs, chemicals and medicines not otherwise provided for in the Tariff.

Chemicals for the Netherlands

THE Commercial Secretary at the Hague reports that the Netherlands Colonial Service are inviting tenders for the supply of numerous lines of goods, including glue, raw colours, and certain chemicals. Tenders must reach the Director of the Koloniaal Etablissement, Westerdoksdyk 2, Amsterdam, not later than 1 o'clock on October 10. Copies of the specifications, etc., may be seen by interested British firms on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference No. 20,701/F.W./G.P.

Quarrying Affects Limestone Uniformity

IT is undoubtedly true that the character of lime depends largely on the nature of the parent limestone, states Mr. Oliver Bowles, mineral technologist of the Department of the Interior, in Serial 2,479, just issued by the U.S.A. Bureau of Mines. A high calcium lime cannot be manufactured from a dolomite, nor can a pure lime result from the calcination of an impure raw material. However, in the process of turning limestone into lime man is not entirely helpless in his control of quality. Even though a deposit is variable in character a single lime product of uniform quality may be produced by judicious quarrying. A single grade of product may not always be desired; the producer may wish to supply the needs of a variety of users, each demanding a different grade or quality of lime. Such a series of graded products may be produced in part at least by modifying the quarry method. Thus, by changes in quarry practice a single product or a variety of products may be made.

Scientific and Industrial Research Report

THE report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1922–23, issued on Wednesday contains an account of the work of the National Physical Laboratory, and of the researches conducted by the research boards and committees appointed by the Department to investigate particular fields, such as those of fuel, food, forest products, building materials, etc. The estimates submitted by the Department for 1923–24 amounted to £276,863, compared with £297,437 for 1922–23. The total expenditure of that Department during the financial year 1922–23 was £497,549, of which £264,493 was met from the Parliamentary vote.

Grants numbering 304 have been awarded to individual research workers and students in training during the past year, an increase of 24 on the number for the previous year. The cost of these grants for the academic year ending September 30, 1923, was estimated at £50,000.

Low Temperature Carbonisation

The report states that the result of the Board of Trade inquiry into the method of charging for gas by therm—which was based on a report of the Fuel Research Board to the Board of Trade—showed that the complaints made against the therm were entirely unfounded. During the year new experimental vertical retorts based on Scottish shale oil practice had been erected at the fuel research station with a view to low temperature carbonisation on a commercial scale. Comprehensive tests were carried out at the station on the efficiency of water-gas plant working under various conditions, and the results have been published.

A report has also been issued dealing with the production of air-dried peat, and included information as to the present position of the winning of peat in Ireland, Canada, Sweden, and Germany. A new committee had been established in South Yorkshire for the survey of the coal resources in that area. Reports had been received from the Dominions and Colonies as to the possibility of producing power alcohol locally from cassava waste, molasses, sweet potatoes, etc., cultivated for the purpose.

Poisoning by Arseniuretted Hydrogen

ON Friday, September 26, at the resumed inquest on a man employed at a metal foundry at Blackfriars, the coroner found that death was caused by poisoning by arseniuretted hydrogen. At the previous hearings it had been shown that the deceased was filling sacks with metal dross during a thunder-storm, and next day he complained of internal pains, while his skin gradually became copper coloured. It was supposed the condition was brought about by fumes of arseniuretted hydrogen given off from the residue metal.

Dr. Rose, divisional surgeon, gave it as his opinion that death was due to the effects of poisoning by arseniuretted hydrogen.

Mr. Harrison, a Government chemist, proved that he found the poison present in a sample of the dross. The dross would be capable of giving off arseniuretted hydrogen with the addition of water. He did not think the atmospheric electricity of the storm would do it.

Mr. Alfred Munday, the firm's engineer, re-called, said that it was the extraordinary storm that caused the sacks to get wet, because they were thought to be in a dry place.

Catalogues Received

JAMES GORDON AND CO., LTD.—"Combustion Control" is the title of an illustrated booklet issued by this firm of Windsor House, Kingsway, London, describing the Duplex-Mono automatic gas analysing recorder, which not only records the proportion of CO_2, but of combustible gases also, at intervals of one second only if desired. The illustrations show the installations of the apparatus at several large power stations and works, where combustion control is desirable.

A. GALLENKAMP AND CO., LTD.—Price lists have recently been issued by this firm from 19 and 21, Sun Street, Finsbury Square, London, E.C.2, dealing with Kavalier's Bohemian glassware for laboratories, Davies' improved double-surface condenser, copper-coated laboratory glassware, and a special offer of British-made analytical weights.

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Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BRITISH CELLULOSE AND CHEMICAL MANUFACTURING CO., LTD., London, S.W. (M., 6/10/23.) Registered September 20, mortgage (supplemental to Trust Deed dated August 4, 1922, securing £500,000 1st debenture stock); charged on various offices at 8, Waterloo Place, S.W., 169/171, High Road, Willesden, and lands at Willesden and Derby. *£452,500. May 15, 1922.

SWITHEN BLEACHWORKS, LTD., Haigh (Yorks), chemical manufacturers. (M., 6/10/23.) Registered September 20, £400 1st, £200 2nd, and £200 3rd debentures respectively, to Miss M. E. Wakefield, Mrs. R. M. Wakefield, and L. S. Wakefield, all of Church Lane, Thornhill, Dewsbury; general charge. *Nil. June 18, 1923.

Satisfaction

CHADWICKS (MANCHESTER), LTD., bleachers and finishers. (M.S., 6/10/23.) Satisfactions registered September 21, £1,000, part of amount registered June 5, 1912; and £500, registered March 11, 1913.

London Gazette

Companies Winding Up Voluntarily

HOOD (C. I.) AND CO., LTD. (C.W.U.V., 6/10/23.) A. F. M. Edwards, 1 and 2, Snow Hill, London, appointed liquidator.

OXIDE, LTD. (C.W.U.V., 6/10/23.) R. Carpenter, chartered accountant, Midland Bank Chambers, North Street, Brighton, appointed liquidator.

PRICE'S SOAP CO., LTD. (C.W.U.V., 6/10/23.) H. G. Rushton, Lever House, Blackfriars, London, E.C.4, appointed liquidator. Meeting of creditors at Lever House, Blackfriars, London, E.C.4, on Monday, October 8, at 11 a.m.

WATERS BROS. (BARRHEAD), LTD. (C.W.U.V., 6/10/23.) J. Peacock (Peacock and Henry, C.A.), 111, Union Street, Glasgow, appointed liquidator. Meeting of creditors at the liquidator's office on Friday, October 12, at 11 a.m.

Bankruptcy Information

D'AURIOL, James Charles Ventre, 777, Harrow Road, Middlesex, dyer and cleaner. (R.O., 6/10/23.) Receiving order, September 24. Creditor's petition. First meeting, October 8, 12 noon; and public examination, November 29, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

FENTON, Harry, lately carrying on business as a laundry proprietor, at 83, Cleveland Road, Surbiton. First meeting, October 5th, 12 noon, 29, Russell Square, W.C.1. Public examination, November 13, 12 noon, The Court House, Kingston, Surrey.

New Companies Registered

BRITISH FERRO-SILICATE TAR MACADAM AND CONCRETE CO., LTD., 5, Quay Parade, Swansea. Manufacturers, mixers and retailers of tar and bitumen macadam, etc. Nominal capital, £5,000 in £1 shares.

JANE HAMBLING, LTD., 14, New Bond Street, London, W.1. Manufacturing chemists. Nominal capital, £2,000 in £1 shares.

PETER KENYON, LTD., Avondale Road, Cheadle Heath, Stockport. General drysalter, dealers in drugs, chemicals and chemical products. Nominal capital, £5,000 in £1 shares.

MILTON PROPRIETARY, LTD., 125, Bunhill Row, London, E.C.1. Manufacturers of and dealers in chemicals, and disinfectants, chemical products and by-products of all kinds, etc. Nominal capital, £200,000 in £1 shares (100,000 10 per cent. cumulative participating preference and 100,000 ordinary).

PYNOL, LTD. Producers, refiners, storers, distributors of oil, oil mixtures, petroleum and the products thereof, chemicals, and chemical products, grease, essential and other oils. Nominal capital, £50,000 in £1 shares. Solicitors: Simmons and Simmons, 18, Finch Lane, London, E.C.

The Use of Zinc for Testing Accumulator Acid

MR. W. O. ANDREWS, F.I.C., in a paper read recently before the South African Chemical Institute points out that the use of zinc in testing for the presence of certain impurities in accumulator acid depends on the fact that pure dilute sulphuric acid is without appreciable action on pure zinc. The presence of the more electro-negative metals such as platinum, antimony and copper in the acid causes the liberation of hydrogen as minute bubbles due to the metal precipitating on to the zinc and with it forming a zinc-metal couple.

In the practical application of the zinc gassing test to the detection of certain metallic impurities in accumulator acid the following is a convenient method:—About 10 c.c. of the acid to be tested (s.g. 1·2) is placed in a test tube and a piece of pure granulated zinc, about 1 gram in weight, is dropped into the acid. At the end of a convenient time-limit (say 15 minutes) the presence or absence of bubbling is noted. If both the zinc and the acid are quite pure, there will be no steady evolution of hydrogen at the end of this period. As a rule, a comparatively large bubble of hydrogen may be seen clinging to the metal, but it can be detached by shaking the tube. If, however, the acid contains traces of the more electro-negative metals (specially platinum, antimony and copper), the evolution of gas will be steady, and appear as minute bubbles rising continuously through the liquid. Unfortunately the average sample of "pure zinc" is not good enough for this test, out of twenty samples of nominally pure metal tested by the author only one was found to be satisfactory. This was labelled "Zinc Kahlbaum."

Corrosion of Steel in Contact with Copper

IN a paper read before the American Chemical Society recently by Messrs. W. G. Whitman and R. P. Russell experiments are described in which the natural water corrosion of steel in contact with a metal lower in the electromotive series has been quantitatively determined. The results show that the total corrosion is the same with bare steel plates as with steel specimens of the same size having 75 per cent. of their surface copper plated—*i.e.*, in the latter case the corrosion per unit area of steel is four times as great as in the former. The total corrosion observed is determined by the total effective surface available for the depolarisation of hydrogen by dissolved oxygen, the actual corrosion occurring on the steel alone. These results are not readily explainable by the colloidal theories of corrosion advanced by J. N. Friend or Bengough and Stuart, both of which agree that hydrogen is not an essential in natural water corrosion. The data are, however, in entire accord with an electrolytic mechanism of corrosion. The electrolytic theory explains these results by picturing the increased corrosion per unit area of steel as caused by the depolarisation of a film or nascent hydrogen. This film is deposited on the steel and on the adjacent copper surface and its removal is effected by diffusion of dissolved oxygen into the metal. The rate of corrosion is limited by the rate at which oxygen can diffuse in to react with the surface film of nascent hydrogen.

More Unemployment

THE Ministry of Labour states that the number of persons on September 24 recorded on the live registers of the employment exchanges in Great Britain was 1,232,000. This was 3,847 more than in the preceding week. The number working systematic short time and drawing benefit for intervals of unemployment was 74,800 on September 24, compared with 74,724 on September 17.